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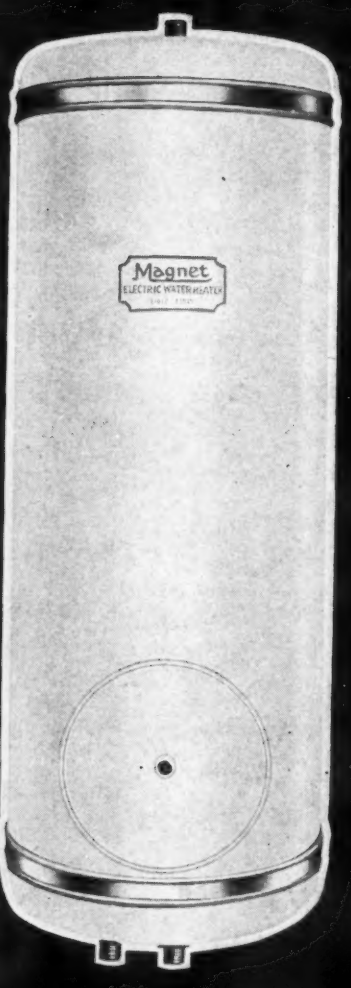

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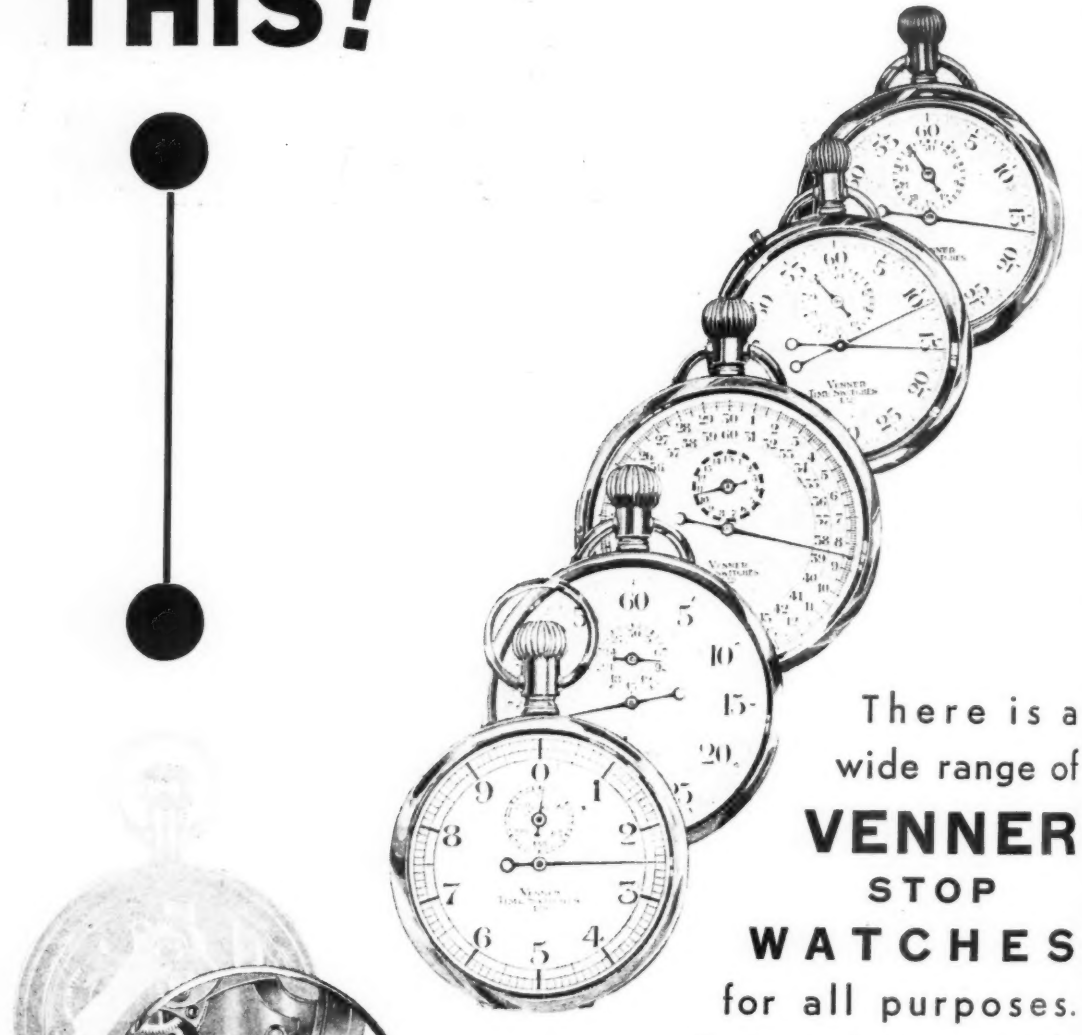

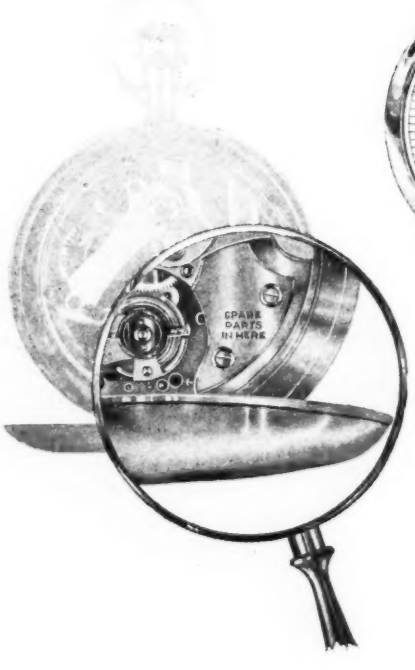

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The
Electrical Review

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Hopes That Were Deferred

CLOSE students of our electrical history know that our changing industry has always been blessed with men of optimism. Everybody will be ready to excuse those whose expectations and prophecies were exaggerations, because the hopeful outlook of so many others has found full justification in the general record of achievement. Enthusiastic forecasts concerning both inventions and movements have time and time again turned out to be wrong.

Hundreds of promising ideas were born too soon in the brains of inventors, and for that reason it was impossible for them to reach full development. They needed other times, and other minds qualified to co-operate, so that there might be a congenial atmosphere in which they would reach maturity and application.

The ELECTRICAL REVIEW volumes, especially during the last forty of its sixty-two years, contain particulars of many things which have remained unapplied, and others which have been re-introduced a second and even a third time without success, which possibly would have had a different fate if their conception had come amid a different environment.

Two examples of unfulfilled forecasts will serve to illustrate what is passing through our mind—both matters of topical interest. Fifty years ago, when the incandescent electric lamp of Swan and Edison made its commercial appearance and electric lighting companies sprang up in the night, so to speak, leader writers of this REVIEW predicted an early abandonment of gas as an illuminant. It makes curious reading after half a century. We certainly had our optimists then, who could not foresee that there soon would come from the laboratory to the assistance of gas interests the incandescent mantle of Welsbach.

Later, the carbon filament lamp gave way before the metal filament and the gasfilled lamps, giving the electric-lighting interests opportunities for electrical advance which would eclipse gas lighting.

To-day, does any impartial person who has a free choice adopt gas lighting for his home when electricity is the available alternative? Yet the early forecasts of our prophets regarding gas securities have not been fulfilled, because new factors quite beyond their possible conception have come into play, finding profitable business for gas companies.

The other electrical example of hoped-for but still unfulfilled development that we have in mind is the use of the electric vehicle on common roads in which to-day we welcome a revival of organised interest.

Forty or fifty years ago the use of batteries for traction purposes was a subject of widespread interest. There were many inventors; some succeeded magnificently, others failed completely. But in the pages of this journal great interest was taken in the legislation which removed the red-flag handicap. Secondary batteries were tried for running tramways in East London, and were used for years at Birmingham. There were enthusiastic hopes regarding the great times that were approaching for the electrically propelled vehicle. The General Post Office tried electric mail vans, and the conversion of the entire fleet seemed likely. A company was formed to equip and run electric omnibuses in London, and many private electric cars were put into service by well-known stores and by motor companies.

But it was not in Britain alone that the electric vehicle business promised to assume proportions; across the Atlantic the movement made great headway, and the statistics of such cars in service showed rapid growth—for a time.

The Vehicle Committee

FROM particulars given on a later page it will be seen that a new effort is shortly to be made to bring about a more rapid rate of progress than has so far been recorded. We have had an Electric Vehicle Committee for twenty-one years. Perhaps it has existed in name only for part of that period, but it has now been reorganised and registered, and will shortly, we hope, get very energetically down to its job. The reasons why the light electric vehicle did not

continue to make the progress that had begun are well known to battery men and to motorists generally. The equivalent of the gas mantle found its way into automobile development, but electrical men, optimists still, are confident that the last word has not been said. The interests concerned with the new committee state what they believe can be done over specified periods by way of growth in the number of "electrics" in service, and everybody will hail with satisfaction the announcement of the campaign which is to be waged this autumn, as mentioned in this issue. We hope that we shall soon see the British electric vehicle industry filling a much larger place in the great motor-car world, and adding considerably to the consumption of electricity.

Ignorance is Bliss

How far should a supply authority conceal facts relating to the conditions of use from its consumers if by doing so it makes them happy? We recently heard of two cases in point. In the first, the undertaking charged certain industrialists on a maximum demand tariff for motive power and at a relatively high flat rate for lighting, but later conceded the claim of the consumers that both services should be charged at power rates. The revenue was thereby increased, indicating that the lighting consumption had, in view of its low load factor, been charged previously at an uneconomic rate. The undertaking received credit for its readiness to meet its consumers' wishes. In the second instance, when negotiating a power contract the estimate of the m.d. made by the works engineer was much higher than that of the undertaking's officials, who finally settled the matter on the basis of a lump sum for a specified installation that would have represented a low kW charge had the consumers' figures been justified. The consumers in return agreed to pay a somewhat higher kWh rate than was originally proposed. The anticipation of the undertaking's engineers proved to be approximately correct, so the consumers, without knowing it, paid appreciably more than they would have done under the initial offer and were much more satisfied, having got their way.

The Next I.M.E.A. Convention

At a recent meeting of the Folkestone Town Council it was resolved that the Incorporated Municipal Electrical Association should be granted the free use of the Leas Cliff Hall and the Town Hall from June 17th to 22nd, 1935, for its annual conference. That the convention will follow the usual lines is indicated by a further decision that the Mayor should be granted the use of the Leas Cliff Hall for a reception, and £50 should be charged for the use of the Marine Gardens Pavilion for an exhibition.

German Electrical Advance

German electricity supply authorities are preparing a big autumn campaign. Propaganda schemes for encouraging the use of electricity for lighting and ordinary domestic purposes, and to provide more work for manufacturers and contractors, are in hand. Heating and refrigeration are to be strong features in this year's special effort. As stated in last week's ELECTRICAL REVIEW (p. 188), great benefit accrued to the German electrical industry as a result of the propaganda movement in 1933. Manufacturers formed themselves into a new Federation, and the Minister of Economic Affairs supported the new organisation's plans for expanding the sales of both electricity and apparatus.

Trouble in Ontario

Reports of a remarkable nature regarding the Ontario Hydro-Electric Power Commission have reached us from different directions. The Federal Royal Commission's investigation into the "Abitibi deal" and the holdings of certain senators was opened last month in Toronto, and from the *Electrical World* received this week we learn that the new Hydro-Electric Commission has been engaged in "cleaning house in a typically political manner." Dr. F. A. Gaby, the chief engineer, was dismissed, and forty-six engineers and other employés with salaries of over $5,000 a year received notices of dismissal with the option of remaining at such salaries as the Commission might pay them. Our contemporary deplores the fact that they are being subjected to such penny-wise political treatment, though they have worked hard to build up and operate the vast organisation, have been paid relatively low salaries, and have played no part in politics. It cites this political flagellation of conscientious and competent employés as evidence of the evils of political control of utilities. Whether the former Commissioners were guilty or not guilty in the "Abitibi deal" seems to have no relation to the competence of the staff.

Political Victims

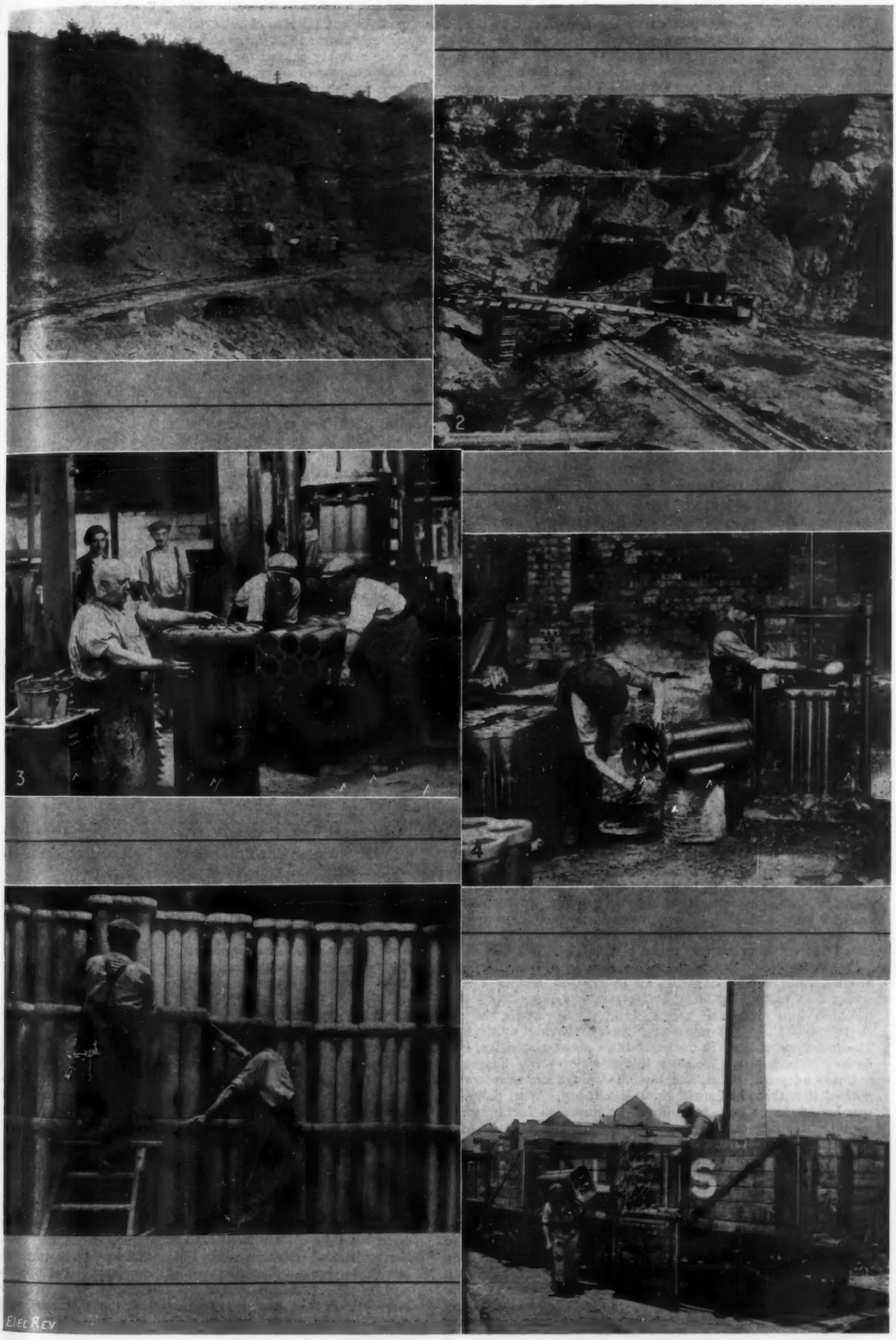
Dr. Gaby became chief engineer twenty-two years ago, but he was summarily dismissed in June for reasons which have not been made public. This event immediately followed a provincial election in which the Conservative party was badly defeated by the Liberals. The Press published criticisms of unduly high salaries and of long-term contracts for unrequired power. The personnel of the Commission was changed and the dismissal of Dr. Gaby and others followed, and information received by the last mail indicates that a state of uncertainty regarding the future exists among the whole of the personnel. Only fuller details can enable us to judge whether the new body can show justification for the sweeping changes so harshly introduced. Unless they can prove that they are influenced by solicitude for the future conduct of this great enterprise, the suspicion will continue that the staff are the victims of the politicians.

The Outlook in China

Readers will be glad to study the very encouraging article appearing on page 210 to-day regarding the hydro-electric work in China that lies awaiting exploitation by British engineers. Professor C. A. Middleton Smith, of Hong Kong University, who has done such excellent work amongst Chinese students, has written periodically for the ELECTRICAL REVIEW, since he went out from this country many years ago, on the need for our electrical and general engineers and manufacturers to persist in their efforts in the great Chinese market. If the course of events there had been normal we should have profited more than we have done from his advocacy of the merits of British engineering. The present article comes very opportunely just now, when it is recognised that increased export trade activities are essential to the successful working of our factories. China is as dependent as ever on imported machinery and equipment. Professor Smith advocates the setting up of an International Water Power Commission in China. This is a practical suggestion which, if it could be carried out soon, might prepare the way for development along right lines in certain areas where hydro-electric power can be economically employed. An action with more immediate possibilities is the sending of a mission to Manchoukuo, by the Federation of British Industries, to ascertain how far British industry can co-operate in its development.

A Museum Exhibit

We read with considerable interest that the Gas Light & Coke Co. has presented to the Children's Gallery of the Science Museum, South Kensington, a diorama illustrating the modern all-gas kitchen, while for purposes of comparison a kitchen of a hundred years ago is shown in a panel beside it. Already a model of a modern gas works is on view at the entrance hall. While we are far from begrudging our opponents the proper place for their product in the history of the race, we may say that, for some of our readers at any rate, the presentation of gas equipment—even the most modern—to a museum will be quite appropriate.



The Production of Stoneware Conduit. **(See page 206)**

1 & 2. Views of the clay quarry. 3. An extruding press and conduit being trimmed. 4. Applying self-aligning joint material. 5. Stacking conduit in a kiln for hard firing. 6. Loading up a consignment in railway trucks

A Stoneware Conduit Manufactory

BECAUSE of the greater ease with which it can be laid, self-aligning multiple-way stoneware conduit is now generally employed in preference to the older butt-ended pattern as a protective enclosure for electric cables which are laid underground. The range of types which has been supplied under the trade name of "Granitic" to the General Post Office, other Government Departments, and electricity undertakings at home and abroad for over forty years by the Albion Clay Co., Ltd., is fitted with the Stanford bituminous self-aligning joint, which enables the conduit to be quickly, and consequently economically, laid.

One of the manufacturing essentials of this ceramic product is the appropriate blending of pure stoneware clays in order to obtain a very dense and non-porous body, specially selected for electrical purposes, before it is hard-fired and salt-glazed. The finished conduit is remarkably durable and capable of withstanding very considerable crushing and bursting stresses.

Under the managing directorship of Mr. G. O. Lawton, the company operates three works, at Moira in Leicestershire, at Swadlincote in Derbyshire, and at Woodville, near Burton-on-Trent. A tour of the last-named works under the guidance of Mr. J. Brookes and Mr. S. Dowthwaite revealed that five distinct kinds of clay, and incidentally some coal, too, is excavated from adjacent quarries. This raw material is transported up an inclined narrow-gauge railway by endless-rope haulage, and the trucks are marshalled at the top according to the mixture of ingredients required.

Mixing and Extruding

The contents of the trucks are tipped in a definite mixing sequence into a large hopper, to which is added a proportion of granitic stone in a crushed state. The hopper feeds a crushing mill, which consists of a large rotating pan in which two heavy vertical rollers revolve in opposite directions. The crushed material is next elevated by means of bucket conveyors to the top of the building, whence it falls by gravity through screens, the rejected coarse particles being returned to the crushing mill, while the fine dust is conveyed through chutes to the next process machine.

This is in two parts; the primary open trough-like portion contains two parallel shafts on which are staggered blades so intermeshed that when revolving in opposite directions the material is thoroughly kneaded with added water into a paste. On entering the secondary portion of the machine the paste is compressed by a longitudinal screw, which forces it out through a constricted aperture in a plastic state. This column of paste is cut up into chunks, which are fed into the top of a vertical press, at the lower end of which, on the floor below, is a die suitably shaped for forming multiple-way conduit by extrusion under pressure.

Each length of conduit so formed is placed upright on a revolving potter's wheel for hand trimming before storage in the drying sheds. When sufficiently set, the lengths of conduit are stacked in dome-shaped kilns for hard-firing. At the end of the requisite heat-soaking period sodium chloride is introduced into the kiln evenly all round through the firing ports. This common salt burns and combines chemically with the white hot clay, so imparting a smooth brown glaze to both interior and exterior surfaces of the conduit.

Special Joints

This conduit can be quickly laid by unskilled labour, no mandrels being required, since the joints are made self-centering in the following manner. Each length of conduit is placed upright in a jig press with the socket end uppermost. A hot, bituminous liquid, consisting of a boiled mixture of gas tar, sulphur, and granite dust, is then poured into the top and bottom jig moulds. It evens up all irregularities, and hardens on cooling to make the ends self-aligning. Cement is not used for jointing; there is therefore no risk of its being squeezed into the duct, where it will harden and possibly damage the cables when they are being pulled in.

A gas-tight type of patented joint can be supplied in all sizes and is made in two forms—namely, as a flange to suit any size of cable, or as a plug that can be taken out and bored to the exact diameter required. The plug, or flange, is screwed into the end of the conduit by means of a metal thread inset in the stoneware.

Besides normal pipes, a single duct which is circular inside and octagonal outside is supplied for building up in concrete to form any number of ways. Multi-way conduit is manufactured in flat, triangular, and rectangular clusters, while bell-mounted ends are available for draw-in manholes, besides splay ends of an easy angle and only nine inches long, which facilitate the spacing of cables in manholes and provide room for jointing operations. Accessories include a variety of bends and also split multi-way conduit, which is most useful for replacements when the line has to be broken.

In addition, rectangular and U-shaped stoneware troughing with tile covers and supporting bridges is manufactured for laying cables underground on the "solid" system, as well as split sleeves and several designs of single and twin tee-joint boxes to suit any size of troughing.

Local Electrical Development. By A. Hugh Seabrook, M.I.E.E.

GENERALLY speaking, supply authorities carry out more intensive campaigns of development in residential and rural areas than in business areas. In business districts electrical development is often left more or less to the manufacturer and contractor, especially to the non-electrical manufacturer, who finds that his appliances can be driven electrically better than by any other means.

Few realise the great advance that has been made recently in office equipment. Machines for calculating, adding, duplicating and addressing are all electrically driven; even the machine into which I am dictating this article is all electric, including the automatic record shaving apparatus. The person who fixed it up knew little about electricity, but he had a pocket full of such things as two-way adaptors, ordinary adaptors, plugs, and combined plugs and adaptors (I noticed that these had small protective fuses). With them he was bound to be able to connect up his machine in some manner or other, and he seemed to take them all quite as a matter of course.

I often wonder why electricity supply undertakings concentrate so much on cooking, hot-water and heating, which can be performed more or less indifferently well by wood, coke, coal, and oil. The explanation sometimes received is that they use a large amount of energy. The smaller apparatus, however, has an unrivalled propaganda value, because it calls attention to the innumerable things electricity can do that cannot be done by any other means. Nothing but electricity can operate a wireless set, a clock, the office machines that I have enumerated, portable grinding, polishing, and drilling machines, and apparatus for medical rays and such treatment.

Thousands of lives are saved by the electric "knife" in surgical work; operations are performed that could not be attempted with the surgical knife. One of the effects of the electric method is that there is no possibility of septic action being set up; the electric knife seals, sterilises and heals as it cuts. The industry should let the public know this. There is great propaganda scope here for local undertakings and their local Press, hospitals and doctors.

I am fortunate in living in a village supplied with electricity by a very large undertaking that is among the half-dozen most progressive concerns in the country. It is too modest itself to say much about what it does, but it conducts vigorous publicity and development campaigns, spends a great deal of money upon demonstration and trial of apparatus, puts down mains in scattered areas, and its financial success is phenomenal. To illustrate the extent to which it goes to encourage the public to use electricity I may say that complete wiring and installation schemes are carried out by the staff of the undertaking, including the supply and hire of appliances, while many of the new housing estates are wired for the builders (which is the only way to ensure that sufficient outlets are installed and that heavy enough wiring is put in). Any appliance will be supplied on the deferred payment system. Even the most expensive apparatus is sent on seven days' trial, and the consumer is visited by experts who will show him exactly how to operate it. Many things are done that few other undertakings will do for the convenience of consumers.

My own supply was connected from the road with a private main to the house, and the undertaking's terminals and meter were fixed in a converted dog-kennel just inside the fence. Owing to road operations this connection had to be removed, but there was a sub-station on my boundary at the opposite end of the premises. An old fowl-house was within a few feet of this, and I suggested that the metering outfit might be put in this place, which was done, thus saving expense.

The undertaking has an excellent method of training its branch representatives. The representative responsible for the village in which I live can obviously be only a junior, but when I speak to him he gives me the impression that he has the same authority to deal with electrical matters in his little

district as the chief engineer himself. How many heads of big undertakings have sufficient courage to delegate their responsibilities in this way?

I rang up the local office to say that as my household laundry equipment, which was about thirty years old, had more or less worn out, I was contemplating an electrical laundry outfit. Full particulars of the trial, hire-purchase and cash arrangements for this apparatus were sent to me immediately. Most undertakings send to their prospective consumers particulars of what may be called the "Rolls-Royce" class of apparatus, although a lower grade might do all that was required at a much lower price, but while I received particulars of this type of outfit details of a more inexpensive machine were included. I was told I could test them both for a week, which I did, and after carefully examining all the parts of the cheaper machine, I decided to purchase it.

The undertaking also encourages representatives to take part in public functions in village halls where electrical appliances can be lent for a particular occasion. This almost invariably results in the purchase of the appliance or appliances. An electrical undertaking that carries out its duties in this way is a real public benefactor, and the good financial results should encourage more timid undertakings to embark on intensive campaigns of local development.

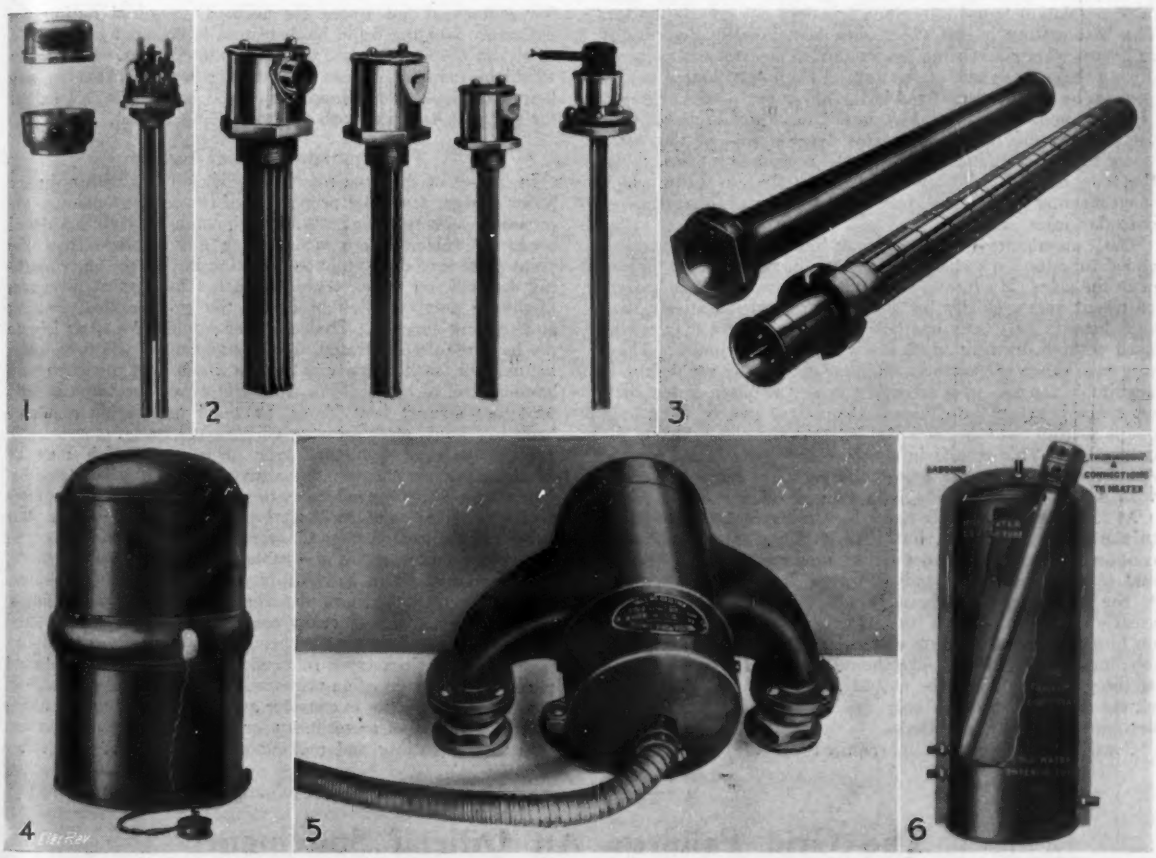
Water Heaters. By A Consumers' Engineer

ALTHOUGH properly designed "self-contained" water heaters have a greater thermal efficiency than have heaters attached to ordinary circulating cylinders, the latter have made a big appeal in the last few years, for several good reasons; as both first and fixing costs are lower, the "all in" cost is considerably below that of a "self-contained" heater for equivalent duty.

The figure at which energy is supplied for water heating is usually such that the cash value of the kWh wasted per annum does not seem so formidable to the consumer as the additional cost of the self-contained heater which would be necessary to avoid such loss. Further, the self-contained heater requires floor or wall space which cannot be afforded in most houses, whereas the "converted" cylinder generally requires no additional space.

Of the types of heater which are now available for the conversion of such cylinders the simplest is the not very widely used belt type which can be clamped to the outside of the cylinder, which has not to be cut. The belt earned a rather bad reputation in its early days due to poor design, which resulted in frequent failures. This trouble has now been overcome and, provided reasonably good contact can be obtained between belt and cylinder around its whole circumference, there need be no fear of failure. This type has a further advantage in that it can be moved up and down the cylinder from time to time if requirements vary as, say, between summer and winter, and can be easily removed.

By fixing two belts, one at the bottom and the other at the top or near the top, and connecting them through a three-heat switch, a flexible arrangement can be made to meet requirements varying from hour to hour. The top element on medium heat will be used for normal daytime requirements. Both elements in parallel on "high" will meet bath time or emergency needs, while both in series on "low" can be used for heating up overnight.



Some Examples of Electric Water-heating Apparatus

1. A Santon "Circ-Stat" with the cover and circulating tube removed. 2. Flat-bladed immersion heaters (Electric Fires, Ltd.). 3. A Reyrolle tubular immersion heater. 4. A Santon belt-type heater. 5. An external circulator (Watson-Norie, Ltd.). 6. The "Circ-Stat" in section

Thermostatic control entails the use of two thermostats, one in series with the top heater, and the other just below the top heater in series with the bottom one. One thermostat will give satisfactory results only when the ratio A to W (1) is less than that of B to W (2), where A is the quantity of water above the top heater, B that between the heaters, and W (1) and W (2) the respective heater loadings. When this condition obtains the advantage of quick heating of A is lost.

Until recently there has not been a means of thermostatic control comparable in cost with that of the heaters, but a "clamp-on" type of thermostat is now available which will probably fill the need. Close regulation will not be obtainable, but there is not the necessity for it as with the self-contained types of heater. This thermostat will probably be quite suitable for most "conversion" jobs, and if found to be reliable

should become popular. Some of the less satisfactory details of construction can be easily remedied.

The immersion type of conversion heater may be either of "blade" or "tubular" construction. The "blade" construction consists generally of a mica-wound element in a tinned copper sheath, and is comparatively costly to produce, considerable care being necessary in assembly to ensure reliability. In situations where a high loading has to be accommodated in a small space it is very useful, but this does not generally apply in domestic water heaters. A heater of this type using an element embedded in refractory material is being somewhat widely used, but it cannot be loaded as highly as the mica type. The "tubular" construction is very reliable if properly designed, but the required loading cannot be made in a length which will go into the average cylinder. This makes two heaters necessary, and brings up the cost both of the heaters and their fixing. As they can be obtained in a wider range of loadings than is the case with the belts, they are frequently preferable. Their use is often justifiable where a comparatively cheap installation is required without thermostatic control. The clamp-on thermostat already referred to should also prove useful with this type of heater.

Fixing the Thermostat

Several makers have recently mounted immersion heaters, together with a thermostat, on one plate. This makes a unit which is cheap to fix, but the action of the thermostat is likely to vary under different conditions of water draw-off. Where close regulation is not important this does not greatly matter. The best setting of the thermostat is not easily determined in houses where only a limited amount of hot water is required during the greater part of the day. I think that better service is given by a thermostat fixed in the upper part of the cylinder. It adds somewhat to the cost, but it more definitely controls the temperature of the top water, leaving that of the lower water to look after itself, whereas the reverse is the case when the thermostat is fixed low down. It is the top water which the consumer uses when drawing off in small quantities at irregular intervals.

The "circulators" are immersion heaters fixed in an open-ended tube, and inserted from the top of the cylinder instead of in the side. Much attention has been given to these heaters in recent years, chiefly because they are comparatively easy and cheap to fix. Only one hole is necessary, and they can be fixed without drawing off all the water in the cylinder. There is a wide range of makes to choose from. Many are definitely unsuitable for use in hard water areas, as there is too little clearance between the elements themselves (where more than one is used in the tube) and also between the elements and the outer tube. This results in the building up of lime deposits. Also, the outlets at the top of the tube are often too small, with a similar result. The hole soon becomes choked.

At first, circulators were made in varying lengths, according to the loading required, but now it is becoming general to confine the heating element to the upper portion of the tube and make the tube a standard length, long enough to reach to the bottom of the biggest cylinders in common use. This greatly simplifies matters for undertakings which let them out on hire. The excess length of tube can be cut off to suit each job; incidentally the cut edge should be tinned before insertion in the cylinder. The tube should reach nearly to the bottom of the cylinder, because only the water which is above the bottom of the tube is heated.

Considerable headroom is required for the insertion and withdrawal of these heaters. Some makers are now using a flexible element assembly, so that should the heater itself fail it can be withdrawn without disturbing any shelving or fixtures. These circulators can be obtained with or without thermostats. Attention should be paid to the temperature differential of the "stats," otherwise they may be erratic in their operation.

An interesting modification of this heater was put on the market last year in which a thermostatic flap valve was fitted at the upper end of the tube. This valve was closed when cold, but as the contents of the tube were heated, the valve opened and allowed the water to spread itself over the top of the cylinder. The cold water coming up from the bottom to displace the hot water which had left caused the valve to close again, and this sequence continued until all the water had become hot. Its advantage was that circulation was retarded so that hot water was built up more rapidly at the top of the cylinder, or, in other words, the temperature gradient down the cylinder was steeper. A radical alteration has now been made by fitting a thermostat so arranged that, instead of controlling the temperature of the water, the quantity of heated water is regulated. In the low position, a few gallons of water at the top of the cylinder are heated; by altering the setting, the quantity can be increased until the whole contents of the cylinder are hot.

If this heater fulfils the claims made for it (and I see no reason why it should not) it will be most useful in those thousands of homes, untouched by us at present, where only a few gallons of hot water are normally required during the daytime. Lagging could be dispensed with, or at most only a small cap need be fitted at the top of the cylinder. Heat losses would be reduced because only the top would be hot for any length of time. The remainder would be always cool except for the periods when bath water is being heated.

The Problem of Heat Losses

In houses of the type referred to, heat losses with ordinary water heaters are a big proportion of the total usage, and the consumer feels that his costs are high compared with his actual usage of water. There would be a disadvantage from the point of view of the supply undertaking in that the early morning demand, on which there would not be a great diversity, might be partly superimposed on the pre-breakfast heating and cooking demand. The consumer would have to anticipate his bath requirements and alter the setting of the thermostat beforehand, in the same way that he would have to switch on a hand-controlled heater. He would, however, be automatically protected against heat losses, provided he set his regulator back to "low" after drawing off his bath water.

There remains a further type of heater, which may be described as an "external circulator." This has two disadvantages as compared with the internal type. It requires additional space, and the heat losses are a little greater (but not seriously so) due to the larger exposed surface. This type of heater is more easily accessible in case of element failure, but, of course, such failures in a well-designed heater are practically negligible, except perhaps in "hard" water areas. External circulators generally cost less than the internal kind which is one good reason for their extensive use.

From the various types referred to, a heater can be selected which will suit almost any conditions. For a hiring scheme in particular, the points to consider are, total cost of heater fixing and wiring, ease of accessibility for maintenance purposes, and ease of dismantling and making good in cases of removal.

The Grid Failure: An Official Statement

IMMEDIATELY after the appearance in print of our last week's comments on the recent electrical breakdown in South-East and East England we received the following statement from the Central Electricity Board:—

"At a meeting of the Central Electricity Board to-day (August 8th) consideration was given to a joint report, of which a copy is appended, made to them by the engineers of the Board and the London Power Company, and to the circumstances attending the widespread failure of electricity supply in South-East and East England on Sunday, July 29th.

"On the morning of that day the grid system was deprived simultaneously of the export from two of the three largest power stations in the area, namely, Deptford West and Battersea. The system has always, even on Sunday loading, sufficient margin of generating plant in operation to make good immediately the loss of the largest station's output to the system, and it has also sufficient spare plant ready to be put into operation to maintain that margin against the unlikely contingency of a second station breaking down.

"It had not been contemplated that there could be such an unusual occurrence as the loss of the output of two major stations at one and the same time, and the Sunday disposition of the generating plant in operation had not allowed for such a contingency. Had such an abnormal event happened on a week-day the disposition of generating plant in operation is such that a widespread failure would have been avoided. The Board are satisfied that there was a combination of circumstances that is not likely to recur, and there need be no apprehension of any such general failure in future."

The joint report of the engineers referred to above, signed by Mr. Johnstone Wright (C.E.B.) and Dr. S. L. Pearce (London Power Co.), is as follows:—

"The investigations have disclosed that the trouble did not originate at the Battersea power station of the London Power Company, although it is true that that station became involved in it.

"Every avenue towards elucidating the general failure having been fully explored, the complete inability to discover any other primary cause for the trouble has forced the engineers to the deduction that the general failure originated with the breakdown of one of the turbines at the Deptford West station of the London Power Company—a deduction which fully explains the subsequent trouble and how Battersea power station became involved in it."

A Small Electric Dynamometer. By E. C. Wadlow, Ph.D., B.Sc.

SMALL swinging field electrical dynamometers have been described in connection with a number of investigations, but they have almost invariably employed high speed motors. In contrast, a small slow running constant speed dynamometer, which was originally constructed to give information concerning the coefficient of friction between gramophone needles and records, obviously has other applications.

This type employs a synchronous gramophone motor, which lends itself particularly well to modification as a dynamometer for the purpose in view. It would, in fact, be difficult to achieve the same result with any other type of motor.

The feature of these synchronous motors is that, in order

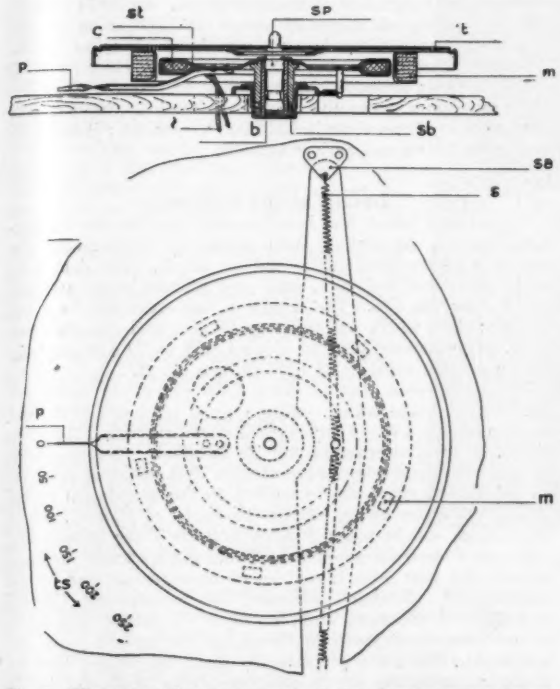


Fig. 1.—The general arrangement of the dynamometer motor

to give satisfactory operation, the stator must be mounted so that it has a small rotational movement about the axis of the motor. The movement is limited either by felt stops or by springs, but over the range allowed the friction is reduced to a small value. To convert such a motor into a dynamometer only calls for slight modifications to the stops or springs, so that the torque reaction may be measured conveniently.

The general arrangement of one of these motors is shown in fig. 1. The turntable *t* is carried by the spindle *s* which runs in the bearing *b*. Attached to the under side of the turntable is an annular assembly containing permanent magnets *m* arranged so as to present seventy-six interleaving poles (alternate north and south) at the inner circumference, this number giving a speed of 78.95 r.p.m. on 50 cycles. The stator *st* has corresponding interleaved poles on its outer periphery, these being magnetised alternately north and south by the annular coil *c*, which is connected to the a.c. supply. The stator is carried on steel balls *sb*, and turns on the outside of the bearing in which the turntable spindle runs. The means for limiting the movement of the stator are not shown.

The Modifications Necessary

For use as a dynamometer the devices for limiting and controlling the movement of the stator of the motor are removed, and weaker springs *s* substituted so as to allow a greater deflection per unit of torque. For measuring torques up to 250 gramme-centimetres the layout and springs shown in fig. 1 were suitable. For these springs 0.015 in. piano wire was used, there being 220 turns on each one. The coils had an outside diameter of 0.190 in., and were close-coiled when free. These springs allowed a stator deflection of about 50 deg. on either side of zero. Stronger ones may be substituted when greater torques are being measured. The maximum torque is limited to the stalling torque of the motor, which may be up to 1,500 gramme-centimetres at 78 r.p.m.

The positions of the spring anchorages *sa* on the motor board must be chosen so that as little side thrust as possible is introduced on the stator bearing. This side thrust is also a function of the initial tensions in the springs, and these tensions should be only sufficient to prevent the value in either spring reaching zero in the position of extreme stator deflection. With this scheme, also, the scale is not uniform, but this is not a serious disadvantage. For greater angular deflections of the stator the spiral type of spring would appear more suitable, but it has not been tried.

The turntable should revolve freely, though it is more important that the friction shall remain constant, as its amount is allowed for in the calibration of the dynamometer. The leads *l* to the stator coil should be as thin and flexible as possible, falling from the stator in a long loop before being attached to the terminal panel on the motor board. A pointer *p* attached to the stator brought out beneath the rotor, and a scale on the motor board, complete the dynamometer.

Calibrating the Torque Scale

In order to calibrate the torque scale *ts* a pulley is fixed concentrically above the turntable. The motor is switched on and started by hand, not being self starting. Torques are then applied by means of a thread wound round the pulley and attached to weights or to calibrated springs. The position of the pointer attached to the stator is marked on the scale for different values of applied torque.

In the experiments for which the dynamometer was constructed the record was next substituted for the brake pulley and used with a pickup in the normal way. The torque required to drive the record under various conditions was then obtained direct from the calibrated scale.

As with all other dynamometers of the swinging field type, the readings are only accurate when the torque has reached a steady value. The speed of the rotor relative to the fixed base of the machine is then as determined by the supply frequency and the number of stator or rotor pole pairs. During transient conditions of loading the rotor may still maintain its predetermined speed relative to the stator, but as this also has now an angular speed relative to the base of the machine, the rotor speed relative to the base may be very variable and unknown in amount.

In other applications the apparatus to be driven may be placed above the motor and coupled direct to it. A drive to a parallel shaft may utilise an endless belt in conjunction with various sizes of pulley to give a wider range of speed and torque.

If a variable frequency supply is available, other speeds may be obtained, as the motor has a fair performance over a wide range of frequency. The performance of a motor on frequencies of 25, 50, and 75 cycles, respectively, is as follows :—

Frequency Cycles per sec.	At 500 g.-cms. V.	A.	W.	Stalling [torque gm-cms.
25	200	0.049	7.0	1,150
50	200	0.041	7.0	900
75	200	0.030	5.2	500

The power consumption is particularly low for a motor of this class and output, and is within the capacity of a simple type of mechanical interrupter. The use of the dynamometer is, therefore, not restricted to a.c. supplies. It may be used with d.c. mains and with batteries. The efficiency of the dynamometer as a motor depends largely on the design and number of permanent magnets used in the rotor, but a torque of 1,000 to 1,200 gramme-centimetres is readily obtained for a consumption of 6 watts (10 volt-amperes) on 50 cycles.

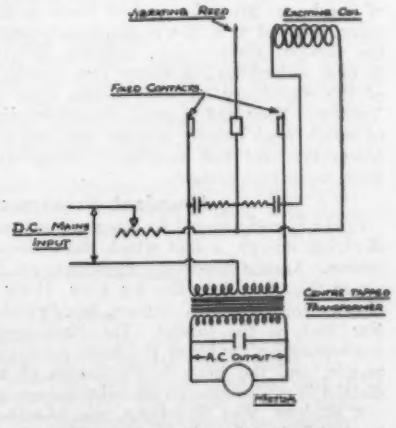


Fig. 2.—A mechanical interrupter

The schematic layout of an interrupter which has been used to supply current to a motor of the type described is shown in fig 2. When designed to run from batteries the condensers and resistances placed across the contacts for spark suppression purposes are not required. For working from d.c. mains, however, they are essential, otherwise the contacts would be soon destroyed.

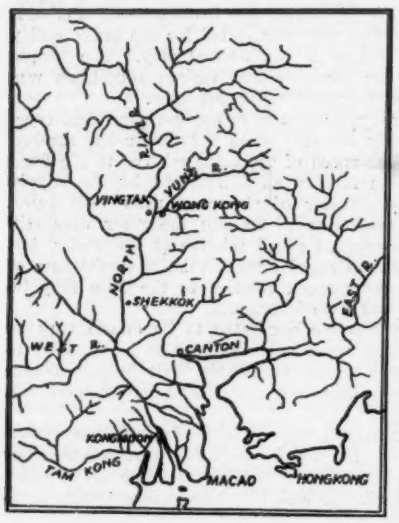
The variable resistance on the input side serves the dual

purpose of limiting the d.c. through the primary winding of the transformer should the contacts stick, and of providing a fine adjustment of frequency. The frequency of the reed is found to be not independent of its amplitude of vibration, and by varying the current in the magnetising coil the frequency can be adjusted to a nicety. Greater variations in frequency can be obtained by weighting the reed.

The condenser across the transformer secondary is chosen to improve the wave form of the current supplied to the motor, and it may be made practically sinusoidal by this means. Unfortunately, the condenser imposes a considerable load on the interrupter, in some cases up to 50 per cent. of the total. There is also considerable high frequency radiation from the interrupter which will cause interference with neighbouring radio apparatus, but it is outside the scope of this article to describe means for overcoming this.

Water Power in China. By Prof. C. A. Middleton Smith, M.I.Mech.E.

A CHINESE engineer from Canton recently informed me that the Siemens (China) Co., a German concern, had signed a contract for 22,500,000 dollars, Hong Kong currency (equivalent to about £1,600,000), for electric power supply in the province of Kwangtung. Of this sum about twenty million dollars was to be used on a hydro-electric scheme, while the remainder was for a new steam station near Canton. I have been asked to carry out certain tests on the materials for the scheme, and the technical details have been explained to me; from what I have learned I am convinced that this is only the beginning of water-power development in China. Indeed, all over China the industrial revolution gathers momentum each year, and Western ideas in applied science are being rapidly adopted.



The Kwangtung drainage area

Concerning the financial arrangements for the scheme, local British commercial engineers say that their firms could not compete with the Germans on that score, and that only a government could finance the contractors. The British Government three or four years ago sent out an Economic Commission to study trade in the Far East, but it made the mistake of including only one engineer, though the future trade field in China must be for the products of engineering factories.

Practically all of the equipment necessary for power production in China must for many years be imported. In the interior transport difficulties are great. In the remote province of Szechuen, 200 miles east of Tibet, a 40-h.p. hydro-electric plant, coupled to a 25-kW generator, supplied from stock by the General Electric Co., provides light for Tai Chien Lu. It took sixteen coolies nearly two months to carry one piece of the machinery on their backs from the nearest port, Yochow. They had to cross two mountain ranges, the passes of which were heavily covered with snow and ice. In some places the road had completely disappeared; in others there were precarious bridges.

Abundant Resources

China is well watered by many streams capable of producing electrical energy, a fact which the Chinese are beginning to realise. Among important waterways are the North and East rivers that flow into the sea near Hong Kong and drain Kwangtung, of which Canton, the British trade base in the Far East, is the capital. The Cantonese have always had the reputation for being the most enterprising of the Chinese people, and the town is the centre of a thickly populated district in which modern factories are spreading.

A student, Man Shu Sing, who obtained his B.Sc. degree in electrical engineering at Hong Kong University, has played an important part in the hydro-electric development of Kwangtung. He was appointed chief electrical engineer of the Department of Reconstruction for Kwangtung Province and chairman of the Hydro-Electric Commission that reported on the utilisation of the water power of one of the smaller streams feeding the North river.

The report points out that: "Kwangtung is rapidly developing as a great manufacturing province, and consequently the demand for electric power increases. As there is a scarcity of coal deposits in the province, the only way to meet this increasing demand for power is to utilise as much as possible the abundant water-power resources of the province." The report goes on to explain that such is the aim of the Kwangtung Department of Reconstruction. In 1933 electrical, civil and geological engineers under the supervision of Man Shu Sing inspected the Yung river, about 100 miles (in the interior of Kwangtung) beyond Canton. The Yung river has a drainage area of about 1,500 sq. miles, and an average record of eleven years gives the annual rainfall as 100 in. The average flow of the river is 5,500 cu. ft. per sec.; it has been as high as 20,000 and as low as 1,035.

Details of the Scheme

The scheme which has been evolved provides for the construction of a gravity-type dam across the Yung river. The height from the foundations will be 140 ft. The dam is to be of reinforced concrete, sand and granite being available on or near the site. The length of the crest will be about 600 ft.; the width at the top 20 ft. and at the base 93 ft. The narrow lake so created will be 11.5 miles long, with a storage capacity of 1,576 million cu. ft.

The initial plan was to draw 5,000 cu. ft. of water per sec. from the lake which, under a gross head of 119 ft., will develop 40,000 kW. Four vertical turbines with 10,000-kW, 11-kV, 50-cycle alternators will be installed. Double-circuit 110-kV transmission lines supported on 70-ft. lattice-steel towers spaced 750 ft. apart are to be run to the sub-station at Sai Chuen, 90 miles away, on the outskirts of Canton, where the voltage will be stepped down to 3,300 V for distribution.

In many electrical schemes in China the economic prospects have in the past been ruined by mismanagement and by the appointment (through influence) of incompetent Chinese engineers. I am more sanguine as to the future than many of my own countrymen in China, as twenty-two years' experience in Hong Kong University make me believe that the younger generation of Chinese, especially those trained in applied science, have a very different outlook and are capable of doing fine work.

Much of the travelling in China is done on the long inland waterways, and, especially to non-technical minds, it seems such an obvious advantage to transform the "white coal" into electrical energy.

[North End Studios, Portsmouth

Prof. C. A. Middleton Smith is Dean of the Faculty of Engineering in the University of Hong Kong. He has had twenty-two years' experience of conditions in the Far East

Another scheme for water-power development relates to the Yang Tze, which is navigable for 600 miles by ocean-going steamers. It has many feeders, and all over the basin the main traffic is by water. At the coast the annual mean discharge is over one million cu. ft. of water per sec.—more than four times that of the Mississippi. In one section of 150 miles the fall is about 45 ft. per mile. Dr. Sun Yat Sen published a vague but grandiose scheme of development in which he suggested enormous dams and locks in the gorges, about 1,200 miles from the sea. This scheme, however, would appear to be impracticable on account of its cost, and because of the distance from any industrial centres. Nevertheless, there are great possibilities of utilising some of the tributaries of the Yang Tze, and the problem is, technically, quite as interesting to-day as was that of Niagara.

An International Commission of experts on water power is needed to prepare data, and to give advice, as to the most expedient manner of utilising the Chinese rivers. At the same time, steps could be taken to overcome the risk of flooding.

Italian Diesel-electric Train Ferries

High-speed engines and double-armature generators

IN order to cope with increasing traffic in the Straits of Messina the Italian State Railways Administration has had constructed two new steel train ferries, each of 2,809 tons gross, with an overall length of 110.56 metres and a breadth of 17.20 metres.

The *Scilla* was built at the Cantiere Federale di Pietra Ligure, Genoa, and has been fitted with Fiat-Marelli Diesel-electric machinery, while the *Cariddi* has been built at the Cantiere San Marco of the Cantieri Riuniti dell'Adriatico, Trieste, and equipped by the Fabbrica Macchine S. Andrea of the same concern and by the Compagnia Generale di Elettricità, Milan.

On the main deck are three tracks, the centre one being 104 metres long, which merge at the forward end where the loading of trains takes place by means of a removable gangway fitted with a single track. Above the main deck, amidships, is the promenade deck, and higher still is the boat deck with the wheel-houses duplicated forward and aft so that the vessel can be controlled wholly from the bridge.

The necessity for various service speeds and speedy manœuvring induced the owners to adopt Diesel-electric propulsion with high-speed engines. This type of machinery has not greatly influenced the total weight of the complete plant, even when compared with Diesel engines directly coupled to the propellers.

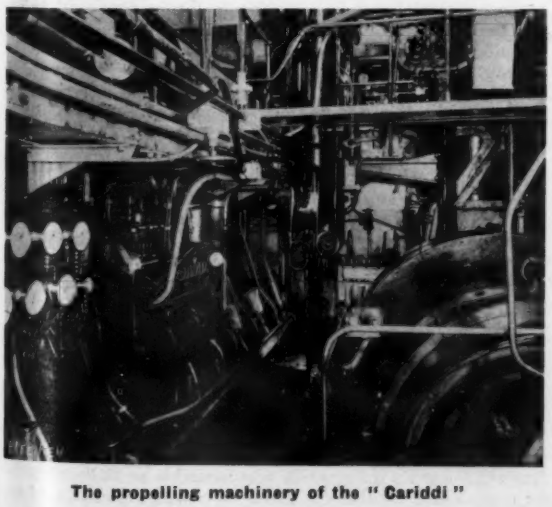
The Electrical Machinery

The electrical machinery of the *Scilla* has been designed, built, and erected by the Ercole Marelli and Cia., S.A., Milan, which has already constructed similar machinery for the auxiliary training ships *Cristoforo Colombo* and *Amerigo Vespucci*, built for the Royal Italian Navy.

Each of the three generating sets comprises a Fiat two-stroke single-acting Diesel engine running at 320-380 r.p.m. and coupled to a Marelli d.c. double-armature generator of 600 kW per armature at 335 V. On the same shaft of each dynamo is a 120-kW 220-V exciter, which also supplies the auxiliary services of the ship.

There are two double-armature propelling motors designed to develop, at 200 r.p.m., 1,125 b.h.p. at 500 V at each armature. Each generator and propulsion motor is cooled by its own ventilation plant with a closed circuit.

The generators feed the two propelling motors through two distinct circuits, and whatever the number of generators in operation, the power can always be distributed equally between the two shafts. Starting, speed control, and direction of rotation of the propelling motors are governed by varying the voltage of the generators on the Ward Leonard system.



The propelling machinery of the "Cariddi"

The drive is through a bulkhead so that the generators and the Diesel engines are in separate rooms. The high voltage used for the propelling machinery has rendered necessary the provision of an appropriate means of periodically testing the condition of the insulation of the propulsion circuits before the ship starts its daily service. This is done by means of a special small converting set which is electrically separated from the other services of the ship. Each propulsion switchboard has its own circuit explorer and general sectionaliser which are required to wholly separate the propulsion circuits which are under test from all other circuits in the vessel.

In the engine-room is a stand-by auxiliary Diesel-dynamo-compressor set of the two-stroke single-acting Fiat type. It is entirely independent, driving directly all its auxiliaries, and the 270 r.p.m. engine is directly coupled to a Marelli generator (with independent excitation) of 170 kW at 220 V and also drives a Fiat air compressor.

The pilot house of the "Cariddi" Diesel-electric train ferry

On the promenade deck the emergency set consists of a Fiat engine of 28 b.h.p. at 450 r.p.m. directly coupled to a Marelli generator of 18 kW at 220 V and, through a friction coupling, to a Fiat compressor. Such services as wireless, lighting, navigation and signals, can be connected with this set.

Each main generator consists of two stators and two rotors built to form a single unit and weighing, with exciter, about 35 tons. The two propelling motors are of similar construction. The general service plant is driven practically entirely by Marelli machines.

High Efficiency

During trials of the *Scilla* the engines developed 2,200 b.h.p. at 380 r.p.m. and the dynamos 1,520 kW with an efficiency of 94 per cent. At full power with 5,400 s.h.p. the speed exceeded 17 knots. Every propelling motor has given a maximum of 2,700 h.p. at 200 r.p.m. with an efficiency of 94 per cent.

The hull of the *Cariddi* is identical and the electrical equipment very similar, except that this vessel is fitted with three B. and W. Diesel engines having a normal power of 1,700 b.h.p. each.

Inquest

AT Eastbourne last week an inquest was held into the death of Griffiths Williams, who sustained severe burns while working on a 10,000-V overhead line on June 8th and died in consequence of these on August 5th. Mr. James Holder stated that he was working with deceased and others at Berwick, and deceased was engaged in fixing a sling for the lowering of a transformer when witness heard a hissing noise. He looked up and saw that Williams was in a mass of flames. He climbed up and put out the flames and Williams was lowered to the ground. He was badly burned about the head, shoulders and feet. The current was to have been cut off at 2 p.m. but Williams began work before that time. A superintendent engineer to Messrs. Johnson & Phillips, Williams's employers, said that the deceased man acted contrary to instructions in ascending the pole before he had been notified that the current had been cut off.

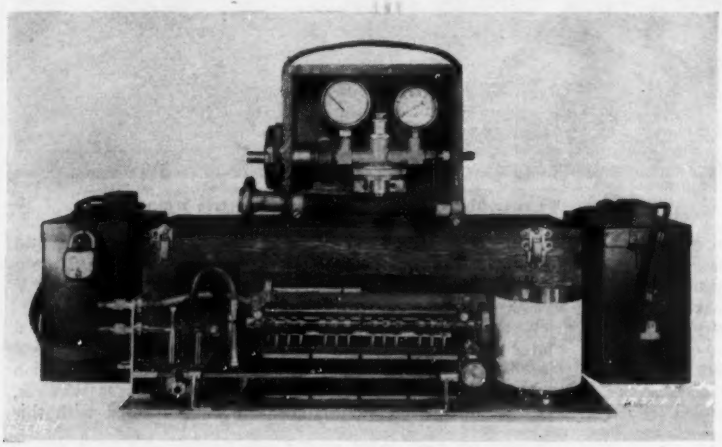
The coroner's jury returned a verdict of "Death by misadventure," and commended Mr. Holder for his action at the time of the occurrence.

Safety in Mines Research

THE twelfth annual report of the Safety in Mines Research Board has been published by the Mines Department (H.M. Stationery Office, price 2s. net). It covers the year 1932-33 and reveals that an automatic firedamp recorder, which was devised in the Sheffield laboratories, has been put into service in the Lancashire coalfield.

The instrument consists of four combustion chambers, each provided with a platinum heating filament and three valves, all the valves being operated by a common camshaft rotated through reduction gearing from a small compressed-air motor which also drives a duplex slide-valve bellows for drawing the air to be tested through dust traps into the combustion chambers in which the methane is burnt at the hot platinum filaments. The reduction of pressure in the chambers consequent on the combustion of the firedamp is measured by an aneroid cell connected through a magnifying system to a thread recorder, and the record appears as a series of dots on the chart of a drum driven by clockwork. The dots showing the percentages of methane are made at intervals of approximately two minutes, so that, with a 3½-in. drum revolving once daily an almost continuous line is produced.

For each chamber in turn the sequence of operations is as follows: mine air is led from the selected place to the instrument by a short pipe line, filtered and drawn by the bellows through the chamber during two minutes. The bellows is then cut off from the chamber, the valve communicating with the atmosphere remaining open for a short period to allow the pressure of the sample to attain that of the surrounding atmosphere. All the valves being now closed, and the chamber therefore sealed, the platinum filament is heated by the closing of the appropriate contactor passing an electric current through it. The valve communicating with the aneroid manometer is then opened and the reduced pressure, which is a measure of the methane percentage, is recorded on the chart. As the operations of sweeping, burning, cooling and recording are displaced in time by periods of two minutes each, the recorder marks the chart twice every two minutes, one dot giving the "atmospheric" line and the other the percentage of firedamp. The accompanying illustration of this apparatus is reproduced from the report with the permission of the Controller of H.M. Stationery Office.



The automatic firedamp recorder described in this article

Coal-dust and Firedamp Ignition

As a preliminary to the investigation of the electrical ignition of coal dust a technique is being evolved for the measurement of the energy liberated at the passing of an electric spark between electrodes. By means of a gasfilled cathode ray oscillograph, records of spark discharges have been obtained; the chief difficulties encountered have been mechanical and photographic, although the construction of a potentiometer free from distortion has not yet been completed.

Attempts are also being made at Sheffield to determine the effects of certain vapours on the ignition of firedamp by hot wires, and the minimum heating current required.

It has been shown (S.M.R.B. Paper No. 36) that when once ignition has been obtained with a platinum wire the minimum igniting current is less in the next experiment with that particular piece of wire. Attempts have therefore been made to stabilise a length of wire by repeated ignitions. With one wire the minimum igniting current fell from 3.9 to 3.1 A and then remained constant for many tests. With this wire small quantities of ethylene dibromide, up to 0.3 per cent., caused a gradual slight increase in the igniting current; also when the same current was used for ignition, the pre-ignition period increased with the percentage of vapour.

Experiments on the ignition of firedamp by the filaments of broken electric lamp bulbs (published as S.M.R.B. Paper No. 80) indicate that no current-interrupting device, unless it can cut off the current before the glass of the bulb is broken, can be effective for any lamps the filament current of which exceeds about 2 A. With smaller currents at voltages up to 6, the device may be successful, particularly with gasfilled bulbs.

The research on the effect of an electric field on the progress of flame in mixtures of hydrogen with air has been completed. Two systems of conditions have been studied.

Though other workers have reported that the flame of hydrogen is unaffected by an electric field, the shadow records show that a field of 2,000 volts per cm. will cause an appreciable alteration in the shape of the flame. In the absence of an electric field the flame spreads as a deeply corrugated sphere. When a symmetrical field is imposed, that is, with one disc charged positively and the other negatively to the same voltage, the flame is drawn towards each disc and thus becomes elongated. The flame appears to be equally attracted by the two electrodes, under all conditions of the electric field employed. Flames of carbon monoxide under the same conditions appear to be different, being drawn as a whole towards the negatively charged disc. Mixtures of methane and air behave like a hydrogen flame.

The amount of ionisation in the flame-front is greater in the earlier stages, when the pressure is low. The duration of the afterglow that succeeds the passage of the flame is equal to that of the ionisation at the same place. The afterglow may be due to the recombination of ions, but not entirely so; the return to normal orbits of electrons in excited molecules of the products of the reaction is apparently responsible for part of the afterglow. A secondary ionisation current, with a maximum considerably after the flame period, has been observed in explosions of $2CO+O_2$. The drier the mixture, the more frequent and more pronounced is this.

When an electric field, up to a strength of 4,000 V per cm., was imposed after the flame had expired, no definite alteration in the duration of the post-flame afterglow was observed. The effect was to reduce the intensity of luminosity between the electrodes and the afterglow appeared to move towards, or to be concentrated at, one or other of the electrodes.

Miscellaneous Electrical Researches

An investigation has been started to discover, if possible, how to interconnect certified telephones of different makes without introducing an element of danger.

A manufacturer is making to the Research Board's design two battery exploders. One incorporates a galvanometer and testing circuit that is switched on to the firing circuit before the firing current is used. This will enable the shotfirer to examine the continuity of the detonator circuit before he attempts to fire the shot. The second exploder is intended to provide ample energy for the firing of six shots in series.

The proposed installation of transformers, cables, lampholders and lamps for face lighting at the mains at the Grasmoor Colliery has been unavoidably delayed.

In connection with the determination of the form and magnitude in time of the wave thrown out by an explosive by spark Schlieren photography a new electrical method has been developed at Buxton for synchronising the discharge of the illuminating spark with the passage of the wave across the field of view and this has been installed in place of the mechanical switch used hitherto. The whole of the high-voltage apparatus is now housed within the observation-room.

Safety Lamps and Roadway Lighting

The efficiency of accumulators has been investigated because several cases of ignitions of gas in hand lamps with alkaline accumulators had been reported. It has long been known that hydrogen and oxygen are evolved during charging of alkaline cells, but no information was available as to the quantity or composition of the gas given off during discharge of the alkaline accumulators used in hand lamps.

When a 2.6-V cell was discharged in a closed vessel connected to an aspirator gas was evolved continuously, but at a decreasing rate during discharge. If the cells were allowed to stand after charging and before being discharged then gas evolution was rapid and the total gas evolved during standing for a period of eight hours was proportional to the time of

standing. A period of standing did not prevent gas evolution during subsequent discharge, although the quantity given off during discharge diminished as the standing time was increased. The gas given off during standing initially contained about 50 per cent. each of hydrogen and oxygen, but the proportion of oxygen increased with the time of standing.

The investigation is not yet completed, but it is clear that after assembly of an alkaline lamp an explosive mixture may rapidly be produced in the lamp casing. Should faulty contact create a hot spot or a spark in the lamp then ignition of the mixture follows.

In all mining countries efforts are being made to improve the illumination of underground roadways.

The danger of ignition of firedamp when the lamp glass and the bulb are broken has been illustrated by an accident which occurred on October 19th, 1931, in the Mont-Cenis mine. Various devices for cutting off the current when the lamp glass is broken are being tried out in Germany, where staff officials only are provided with electric lamps fitted with switches. It is considered that the workers' lamps should remain lighted throughout the entire shift, both as a disciplinary measure and from the point of view of maintenance of the lamps. The fact that the majority of the lamps in service have no switches considerably reduces the danger of the ignition of gas evolved from accumulators. Independent of portable electric lamps, compressed-air lamps and accumulator lamps of high voltage are used on tubs in Germany. In addition, certain roadways are provided with lighting installations fed from the mains.

In Belgium, as in other countries, there is a tendency to increase the voltage of portable electric lamps. It is considered that the danger resulting from the evolution of hydrogen from accumulators is small, inasmuch as the lamp heads are not screwed on to the bodies until some time after charging, *i.e.*, until the evolution of gas has nearly ceased. It is, however, stipulated that, if the lamp is provided with a switch, the current must be broken in a portion of the lamp inaccessible to the gas evolved by the accumulator. Many lamps are not equipped with such a device. Devices for cutting off the supply of current if the lamp glass is broken are not compulsory, but many of the lamps so fitted are approved for use.

In France, the use of electric lamps is becoming more general. Devices for cutting off the current in the event of breakage of the lamp glass are compulsory for all lamps that are not fixed installations; that is to say, not only for portable lamps but also for compressed-air lamps and those connected to a supply cable.

The risk of ignition of hydrogen evolved from accumulators has been eliminated by enforcing the rule that the assembling of the lamp shall be done by means of a screw comprising at least four threads and making a joint at least 25 mm. thick. It does not appear likely that such a joint will have, at any point, a gap of 0.4 mm., which is the width necessary for the transmission of flame from an internal hydrogen-air explosion to the firedamp-air mixture surrounding the lamp. The cases of the lamps are tested in the same way as other electrical apparatus of an internal volume less than two litres under a pressure of 8 kg. per sq. cm.

The Radio Exhibition

THE 1934 Radio Exhibition which opened at Olympia yesterday (Thursday) and continues until Saturday, August 25th, provides plenty of evidence of the activities of research engineers, for quite a number of improved sets and components are introduced to the public. We give here a brief description of some of the exhibits:—

Belling & Lee, Ltd.

The effectiveness of interference and noise suppressors is being demonstrated with cathode-ray tubes. A universal voltage adjuster enables practically any make or combination of valves to be used without additional resistances, and costs only 17s. 6d. Other innovations include side-contact valve-holders and four varieties of plug-top connectors for the new class of valves with terminal shielded or shrouded.

British Permal Enamelled Wire, Ltd.

This company is associated with Johnson & Phillips, Ltd., specimens of whose cables are on view, while the applications of "Permal" wire are being demonstrated. The company has devised a process for covering copper conductors with a coating of insulating enamel which is claimed to be practically free from pin holes and to withstand bending and stretching of the conductors.

Burndept, Ltd.

Standard "Ethodyne" receivers and an a.c. model with a.v.c. incorporate the company's matched and balanced reciprocal propagation of sound feature. The six-valve superhet. radiogram has an automatic record changer and a polished mahogany Sheraton-style case, shaped like an old spinet.

Chloride Electrical Storage Co., Ltd.

A full range of "Exide" accumulators includes the "D" type of cell fitted with an indicator which consists of a dial over which a needle moves between positions marked "full," "half," and "empty." A number of special "Drydex" dry batteries have been developed for the most recently designed battery-operated receivers.

Dubilier Condenser Co. (1925), Ltd.

In a comprehensive selection of condensers for radio as well as industrial uses there are mica varieties completely moulded in bakelite cases, paper-insulated specimens, and dry electrolytic condensers. The reversible dry electrolytic type has been designed primarily for use in universal and d.c. receivers to avoid the risk of damage due to the reversal of polarity in the event of the mains plug being inserted the wrong way round. Metallised resistances are made in standard values from 100 ohms to 10 megohms; ratings available are ½-, ¼-, 1-, 1½-, 2- and 3-W "Spiralohm" wirewound resistances are made for 10-W dissipation, ranging from 200 to 50,000 ohms. Anti-interference devices comprise condensers and resistances, spark suppressors and suppressor condensers.

Dubilier condenser moulded in bakelite

A. C. Cossor, Ltd.

The variable-mu screen grid "Melodymaker" kits of parts for home assembly have been reduced in price, the three-valve battery outfit being priced at £5 19s. and the a.c. mains outfit at £7 19s. An a.c. mains superhet. has a neon tube timing indicator. There is a four-valve a.c. mains radiogram with a silent induction motor and full automatic stop.

Ever-Ready Co. (Great Britain), Ltd.

The whole range of over sixty different types of anode and grid bias dry batteries is featured, including the "Winner," "Popular," "Power" and "Standard" series. The "60" battery is for sets taking up to 30 mA. Super capacity batteries are suitable for public address equipment; they are fitted with spring clip terminals and are made in 45- and 54-V sizes. Grid bias batteries range from 6 to 22½ volts and the company's accumulators are fitted with a novel charge indicator.

Ferranti, Ltd.

A range of high-class superhet. receivers includes the six-valve "Gloria," which is distinguished by the incorporation of an electric clock above the speaker grille. A notable feature of these sets is the large electric "tuning" scale on which different pointers indicate the wave-band; the station being received, its wave-length, the degree of volume; the shade of tone, mellow or brilliant, and whether the set is "on" or "off." The "high note uplift" feature prevents harmonics and noises intruding on the radio-frequency side, and the special amplification of the higher musical frequencies and so properly balances the bass and treble.

General Electric Co., Ltd.

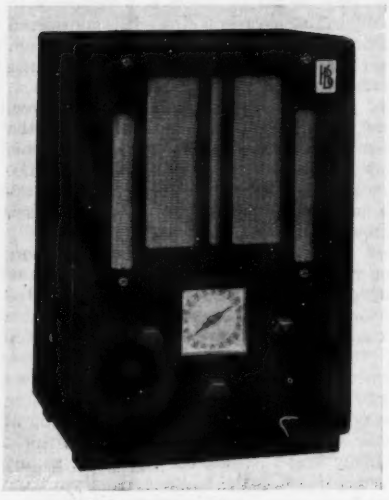
Apart from new types of valves and loudspeakers, there are seven freshly designed receivers, all with built-in moving-coil speakers. The "Compact 3" in a bakelite cabinet is priced at £5 17s. 6d., with provision for a gramophone pick-up and external speaker. A "Class B" output battery set in a walnut cabinet is listed at £9 17s. 6d. For a.c. mains operation a five-valve superhet. set (three models) incorporates delayed and amplified automatic volume control with sensitivity and tone controls which act as auxiliaries to the luminous station indicator. A second stand is devoted to "Osram" valves of all types, including a universal a.c.-d.c. range, while on a third stand is a display of anode and grid bias dry batteries and filament accumulators.

W. T. Henley's Telegraph Works Co., Ltd.

Recently the design of the domestic "Solon" soldering iron has been modified, although the price of 7s. 6d. remains the same. An oval tinned copper bit is now fitted which facilitates work where space is limited. The iron is available for 200/220 V and 230/250 V; the consumption is 65 W. The "Empire" models are for industrial use. The handle is fitted with a patent bakelite terminal box so that all connections are well away from the source of heat. The prices are: 65 W, 9s. 6d.; 125 W, 22s. 6d.; and 240 W, 37s. 6d. Among the many types of radio wires is one for the internal wiring of sets. To expose the conductor of this the insulation is simply pressed back between the thumb and finger. An interesting sample of inductance coil high-frequency cable, as installed in the Rugby wireless station, contains 6,561 wires, each separately insulated with enamel and connected together at each end so that all the conductors are in parallel.

Kolster Brandes, Ltd.

The "Pups" have returned in the form of two new three-valve sets of improved design, both fitted with full-vision



Kolster-Brandes " New Pup "

" clock - face " tuning dials. In addition, there is a new battery superhet. and four new mains-operated instruments. A " universal " superhet. has a thermionic rectifier and four receiving valves: a pentagrid frequency changer, an h.f. pentode, i.f. amplifier, a double - diode-triode for second detector, delayed automatic volume control, i.f. amplifier and an output pentode. A seven-valve " universal " has noise suppression (quiet a.v.c.) adjustable for local conditions, and a third has a neon light indicator to facilitate accurate tuning. A new mains-operated eight-valve a.c. superhet. radiogram has a power output of 5½ watts for the dual speakers. It has an automatic record changer. A new six-valve superhet. employs the new battery h.f. pentode in the first three stages followed by a double-diode second detector, a driver and a " Class B " output valve giving 2 watts to the speaker.

Marconiphone Co., Ltd.

There are two new radiograms with automatic record-changing mechanisms, namely, the five-valve 289 A.C. and the nine-valve 292 A.C., which has a two-stage band-pass aerial filter feeding into a variable-mu signal frequency stage followed by a heptode detector oscillator. Two i.f. stages are used before the double-diode-triode, which functions as second detector and first l.f., while a further double-diode-triode supplies a.v.c. In the final stage there are two push-pull super-power triodes, and an indirectly heated heavy-duty rectifier supplies the anode current. Fading is eliminated; the " delayed " action cuts out blast, and a visual tuning " barometer " light column is mounted behind a separate escutcheon on the tuning scale to indicate exact resonance. Selectivity can be set to 6 or 12 kC and there is a static suppressor.

The new Marconiphone auto-radiogram

McMichael Radio, Ltd.

The Duplex transportable battery receiver with " Class B " amplification and single control is self-contained, needing neither earth nor aerial, and incorporates a moving-coil speaker and pick-up jack. There is a four-valve suitcase portable set of similar design. The twin-speaker superhet. has delayed a.v.c. with inter-station noise suppression, automatic and manual tone control and manual volume adjustment.

Mullard Wireless Service Co., Ltd.

An innovation is the battery double-diode-triode for use as combined detector, a.v.c. valve, and l.f. amplifier. The new output P.M.22.C pentode is capable of a really large a.c. output for modern anode economiser circuits. The range of a.c. mains valves is augmented; foremost is the octode frequency changer, which possesses six concentric grids and operates as a triode oscillator and variable-mu pentode mixer with electric coupling between the two sets of elements. No external coupling coils are required. The familiar valve pins of the " universal " valves have been dispensed with and their place taken by silver-plated side contacts. The overall dimensions of the valves are considerably reduced.

Philips Lamps, Ltd.

The 15-guinea six-valve a.c. super-inductance receiver feeds 2.5 W to a specially designed speaker. It will operate without aerial or earth and is provided with an unusual tuning system, a.v.c., and variable tone control. The 12-guinea six-valve a.c. superhet. model incorporates the new octode frequency changer. The same chassis, but with 3-W output, is used for the 23-guinea radiogram. In a six-valve battery receiver priced at 11 guineas a shutter masks the tuning dial when the set is switched off. There is also a 10-guinea five-valve battery set whose output pentode is controlled by a separate valve for conserving the anode battery.

Pifco, Ltd.

A de luxe edition of the well-known rotameter has now been produced with a more comprehensive scale range of 400 V and a resistance of not less than 500 ohms per volt; the total resistance is 200,000 ohms. Accurate measurements are possible and every required test can be made with the aid of this new test meter, which is modestly priced at 42s. The new a.c.-d.c. radiometer is an improved model of the " all-in-one " test meter. Entirely redesigned, it is fitted in a black bakelite case and is capable of making all the usual tests and, in addition, is suitable for a.c. and d.c. circuits. It is priced moderately at 12s. 6d.

The Pifco " Rotameter "

Radio Research Board

For the first time the Department of Scientific and Industrial Research is exhibiting talking films, which demonstrate the influence of the atmosphere on the propagation of wireless waves, as an illustration of some of the work that the Radio Department of the National Physical Laboratory carries out on behalf of the Radio Research Board.

The film records are made with the aid of a cathode-ray oscillograph, which type of instrument has also been embodied in a " collision preventer " intended for use during fog conditions in congested shipping areas. An animated diagram shows the principles on which the navigator watching the indications can decide whether a change of course is required. Recent modifications of the cathode-ray oscillograph have made it possible to use it as a very rapid switch for controlling light signals in the form of a course deviation indicator to indicate if a ship departs from her course as laid by a radio beacon.

Siemens Electric Lamps & Supplies, Ltd.

In addition to the standard lines of " Full O'Power " dry batteries, there is a range for a number of different makes of sets which require particular types. Three new sizes of grid bias batteries are of 4.5, 6, and 12 V, tapped in 1.5-V steps. Size No. 1188 is a special 300-V battery which has been introduced for use with cathode-ray tubes employed in conjunction with television apparatus. The triple-capacity " Power " type, which is recommended for sets taking from 10 to 20 mA, is now available in 45-, 60-, 108- and 120-V sizes at reduced prices of from 8s. 6d. to 17s. 6d.

" Full O'Power " 300-V television cathode-ray tube battery

Westinghouse Brake & Saxby Signal Co., Ltd.

Among metal rectifiers this year the new " WX6 Westector " makes its first appearance, being suitable for use in " straight " sets, or as the first detector in superhet. circuits, when any form of automatic volume control may be obtained. An example of a typical constructors' type combined h.t. eliminator and l.t. trickle charger is on view. The display of charging sets includes the new " hush-hush " P.G.C.9 charger, produced to meet the needs of all but the larger type of charging station at a strictly competitive price.

Weston Electrical Instrument Co., Ltd.

For the forthcoming season the selective analyser will be supplied complete with adaptors for testing 9- as well as 4-, 5- and 7-pin valves. An entirely new service oscillator is a precision instrument excellently shielded. It has four separate ranges covering from 100 to 3,000 kilocycles on fundamentals. Useful harmonics are obtainable up to 21 megacycles. The well-known d.c. moving-coil instruments are available in a wide variety of ranges from 200 microamperes upwards.

Correspondence

Correspondents should forward their communications as early as possible. No letter can be published unless we have the writer's name and address in our possession

"Lighting the Entrance"

The leaderette on this subject on page 108 of the ELECTRICAL REVIEW of July 27th could be strongly brought to the notice of all private consumers, with every prospect of a successful response. I suggest that this should be done by means of a pamphlet, which could be enclosed with the quarterly account, stating its advantages and low cost as follows:—

On an average estimate of five hours' burning during the evenings throughout the year, the cost would be only 9d. per quarter for a 20-W lamp or 1s. 6d. for a 40-W lamp. The light could be arranged to illuminate the number or name plate of the residence, with a reflector to throw the light along the garden path. If a number of houses were done together the cost of wiring the lights should be only about 10s.

As regards the electricity undertaking, there is no reason why a charge of 1d. per kWh, or even less for entrance lighting should not be to its advantage. The "all-in" tariff is now coming into public favour, and in other cases most consumers have a power circuit. Either of these systems make a low charge possible. Another method would be to wire the lamp from the mains side of the meter and charge it as a fixed-price light.

An alternative would be to lower the charge where water heaters were installed and fit a change-over switch from the heater to the porch light, the consumer being under contract to use the light during the evening. An occasional inspection would soon prevent any abuse of the privilege. As a means of developing new water-heating load the entrance light could be wired for a nominal charge.

The annual revenue to the electricity undertaking from a town of 50,000 houses using 40-W lamps at 1d. per kWh for five hours, would be over £15,000. The revenue from a house using a 40-W lamp and a 500-W thermostatically controlled water heater at ¾d. per kWh would be nearly 2d. per day, or 15s. a quarter.

Manufacturers of electrical fittings would soon find that a demand for a combined artistic lamp shade and number plate had been created.

H. N. NEWCOMB, A.M.I.E.E.

Wimbledon, S.W.19, *August 11th.*

The Grid Breakdown

I noticed two references in your correspondence columns of August 10th relating to the recent grid failure and the gas industry. Whilst there is no doubt that our friends the "gas men" will seize upon this as an example of the alleged superiority of gas from a reliability point of view, I feel that with proper handling it should do the electricity supply industry a great deal of good.

As an electrical engineer who had something to do with the scheme in its design stages I have no fear that a technical error in loading the network such as must have occurred in this instance is likely to happen again.

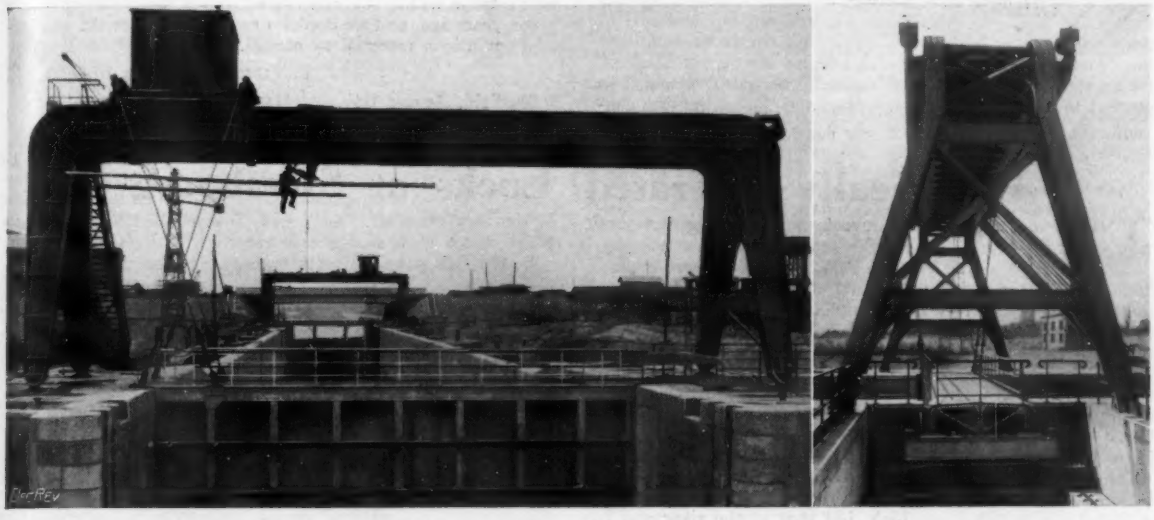
Whilst the lay Press, with its usual "bull-in-a-china-shop" methods made a publicity stunt out of the failure and various articles by non-technical men appeared in the leading daily papers condemning the grid scheme, or at least doubting its efficiency, it gave evidence of one outstanding fact: electricity is fast becoming exclusively used for domestic purposes and that in itself should give us cause for satisfaction.

Stretford, Manchester, *August 10th.* JOHN A. ENGLAND.

Non-standard Voltages

In your issue of August 10th Mr. T. C. Gilbert raises the question of the pressure of supply at the Empire Swimming Pool, Wembley, and suggests that the consultants have misled the consumer. It is only fair to say, however, that the adoption of this pressure was nothing to do with any consulting engineer and it happens for various reasons that it suits the Empire Pool to buy current at low pressure. The transforming apparatus is supplied by the Northmet Company and, therefore, its usual standard pressure of 240/415 V has been adopted.

In point of fact, as long ago as 1906, the company standardised 240 V for all its work for the reason that, at that time, it appeared that this was the highest pressure which could legally be used because, with a declared pressure of 240 V and an allowable increase of 4 per cent. under the then conditions, one was just below a figure of 250 V, which is the limit for low pressure. At this time, there were, however, several concerns operating at 250 V, notably Glasgow, but it did not appear to us that they were within the four corners of the Regulations. Since then more recent Regulations issued by the Electricity Commissioners have made it clear that, if the *declared voltage* is within the limit of 250 V, this is in order.



One of the lock gates at the Vauban Basin, Strasbourg (left) and an end view. (See next page)

Since that time the Northmet Company has altered the voltage of three of the older undertakings from 230 to 240 V and, in the case of a district taken over a few years ago, has raised the pressure from 220 to 240 V, while in another instance the pressure was reduced from 250 to 240 V. In point of fact, in almost the whole of the area covered by the Northmet Acts the supply is at 240 V.

Mr. Gilbert asks if there is any technical advantage in adopting 240 V as against 230 V, but, of course, he is well aware that, for the same size of conductor, there is an extra carrying capacity of about 10 per cent., assuming, as is generally the case, that the limiting feature is not the ampere capacity but the voltage drop.

It is not generally known that the present "standard" voltage of 230 is relatively new. As far back as 1904 an interim report by the Engineering Standards Committee recommended, among other things, that the standard low pressure for d.c. and a.c. at the consumer's terminals should be 220 V. In 1907 this report was superseded by No. 36, but the consumer's recommended voltage remained unchanged. In 1921 a Specification of voltage for new systems and installations was issued, when 220 V was fixed for d.c. and 240 V for a.c. installations. The reason for this was, I believe, that the lamp makers were not, at that time, able to work to very narrow limits of voltage and this arrangement suited them very well, but a few years later the E.L.M.A. proposed that there should be one standard voltage only and finally 230 V for both a.c. and d.c. was decided on and the position is set out in B.E.S.A. Publication No. 77 (November, 1925).

I have never been quite clear as to how this figure was arrived at, but I am under the impression that it was settled because 230 V was then the commonest voltage. On the other hand, I think it had been overlooked that, although it would certainly pay most undertakings to increase their voltage, to have to lower it would be undoubtedly a hardship, and so far as the Northmet is concerned, if the voltage were to be standardised at 250, it would be quite pleased to make a change as the advantages are considerable and the cost is relatively small.

There are, of course, very strong protagonists of low voltage for public supply—110 V or even less, but there does not seem any prospect of such pressures being adopted, while if one is going to adopt a higher pressure, it makes practically no difference to conditions of supply or otherwise whether 230, 240 or 250 V is used.

J. M. DONALDSON, *Chief Engineer*,
NORTH METROPOLITAN ELECTRIC POWER SUPPLY CO.
Southgate, N.14, *August 11th*.

Poor Industrial Lighting

The contents of the report of H.M. Chief Inspector of Factories and your leaderette in the current issue of the ELECTRICAL REVIEW constitute a grave injustice to electrical contractors of repute in Sheffield and should not be permitted to pass unchallenged. It is almost beyond comprehension that the Chief Inspector, after having selected the city of Sheffield for his special investigation of factory illumination, should then proceed to connect without exception the "local lighting contractors" with the deplorable conditions that he reports.

To some, the ironical feature of the investigation will be the "great interest" displayed by the City Council, for it is reputed that its Installation and Motor Department employs a very large proportion of the men engaged on contracting work within the city. The logical conclusion should not be drawn in its entirety as practically the whole of the larger factories and many of the smaller, employ their own electrical staffs; according to the size of the firm the staffs consist of one upwards, illumination design and other things being an unnecessary consideration so long as trade terms are obtained in the purchasing of materials.

The City Council does not, however, carry out the whole of the remainder of the illumination of the Sheffield factories for we are told that there are several hundreds of electrical contractors operating in Sheffield and of these ten are members of the Electrical Contractors' Association and on the National Register of Electrical Installation Contractors; a further seven are members of the Electrical Contractors' Association only.

It will therefore be apparent that, in any event, the organised contractors can be responsible for only a very small proportion of the work done.

We have neither designed nor executed a factory illumination scheme within this city since I joined the company nearly seven years ago, and we disclaim responsibility for the unscientific conditions reported to prevail.

J. F. VAZSON, *Managing Director*,
Sheffield, *August 11th*. MARSH BROS. (ELECTRIC), LTD.

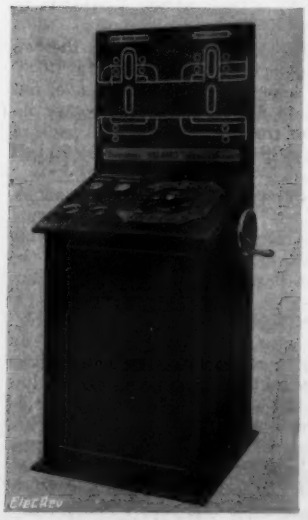
Electrically Operated Locks at Strasbourg

THE first section of the improvement plan for the port of Strasbourg includes the construction of a new entrance into the Vauban Basin some four and a half kilometres to the south of the old entrance. The locks for this entrance, which are now completed, are of sufficient size to accommodate the largest river boats; when the Rhine is at its lowest level the locks are 125 m. long, 13.50 m. wide, and 3.20 m. deep. The direction of the drop is normally from the Rhine into the Vauban basin and may vary from 0 to 5 metres, but in dry seasons, when the Rhine is exceptionally low, the direction can be reversed with a fall up to 50 cm. from the basin to the Rhine.

The lock chamber is closed at each end by a rolling gate 14.50 m. long and 2.70 m. thick. The gate at the basin end of the chamber is 9.45 m. high, but that at the river end is 10.40 m. high. The gates weigh about 100 tons each, but when submerged their weight is reduced to about 22 tons on account of an air caisson in the lower portion.

To open, the gates slide back into enclosures built into one side of the lock walls. On the enclosure end the gate is mounted on wheels running on a track fixed to the skew-backs. The other end of the gate is suspended from a motor carriage running on a frame which spans the lock chamber at a height of 10 m. above the highest navigable water level.

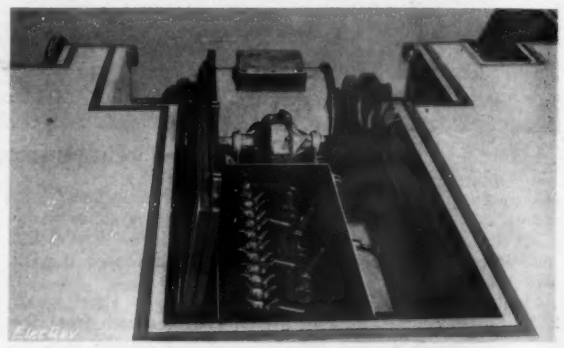
The carriage is run by an electric motor of special design with revolving resistances. This arrangement reduces the upkeep of the motor to the minimum, and obviates the necessity for commutators and brushes. The starting mechanism is also simplified, consisting merely of a contact and a change-over switch. The motor itself forms its own strain limiter; its normal speed is 800 r.p.m. and it has a normal rating of 13 h.p.



The control desk

The motor, which turns a set of gears, the last of them running in a rack at the top of the frame, is fed by means of a flexible cable one end of which is fastened to a drum on the moving carriage so that the cable is wound and unwound as the carriage moves. When the end of the rack is reached the drum acts on an interrupter. The filling and draining of the locks is by aqueducts lodged in the walls of the lock chamber and controlled by sliding gates. There are three such aqueducts at each end of the lock chamber. Each gate is controlled by a separate 4-h.p. motor with double cage rotor.

As the lock gates can only be opened when the water level is the same on both sides, and this level may vary considerably in different seasons of the year, it was necessary to construct an indicator consisting of floats lodged in wells communicating with the water on each side of the gates. The



Part of the operating mechanism

floats are attached to chains which in turn actuate a revolving indicator. Each pair of floats is so arranged that when at the same level the two fingers form a contact and set in movement the mechanism for operating the lock gates.

In order that the locks shall not fill too rapidly, which might result in damage to the boats in them, the flow of water into the locks is automatically regulated so as to remain constant, whatever the level of the water on the other side of the gates. This arrangement is controlled by the floats. When the difference in level is considerable, the sluice gates on the aqueducts are only partly open, but as the difference grows less they are progressively opened farther.

The power used is 380 V, 3-phase, 50 cycles. All the control machinery and apparatus is placed in a cabin on the west wall of the lock, half-way between the two gates, and control is from a desk in this cabin. If desired, the control can be semi-automatic, the various movements taking place automatically in sequence after an initial impetus, while the various movements can also be individually controlled if necessary.

In the first case the indicator on the top of the control desk is brought to the position to indicate the desired operation by means of the handwheel at the side, the "start" button is pressed, and the manœuvre takes place.

To continue the movement it is necessary to move the indicator to the next position. For automatic operation, the indicator is placed on the position of the last operation to be effected, and the "start" button is pressed. The various operations then take place in their order.

New Apparatus and Devices

for Domestic, Cooking and Heating, Lighting, Power and Scientific Purposes

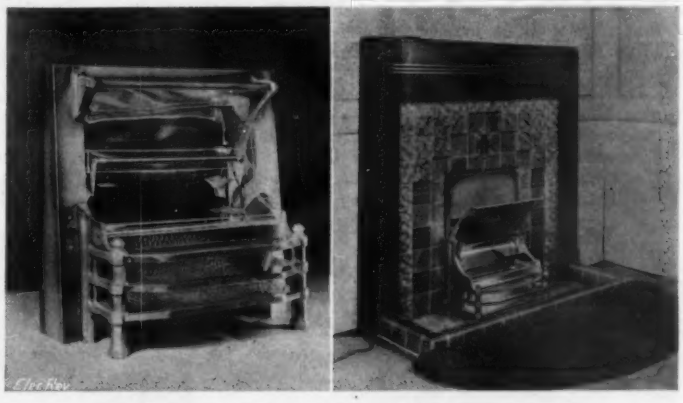
Ferranti Fires

The range of Ferranti fires for the forthcoming season has been extended by several additions. The "Minera" is now produced in a new 600-W size listed at 19s. 6d., with self-adjusting feet for controlling the direction of radiation and three-core flex.

The "Modera" "Glowera" fires are being produced this season with flat backs to serve as a complete screen to an open fireplace. To provide a real covering for the open fireplace when an electric fire is in use, has sometimes presented a little difficulty. This season MESSRS. FERRANTI, LTD., Hollinwood, Lancs, are offering a simple adjustable screen, the height of which is controlled very simply by four screws. It can be fitted to any fires in the "Glowera" range.

Wall-type fires for bedroom use are to be supplied in an additional small size of 750-W loading with a rather smaller reflector ("Minera" range), to suit small rooms where the original fire of this loading would appear somewhat too large in dimensions. The price of this new type is £1 12s. 6d.

The "Newera" fire in a frame of tubular chromium-plated steel will be attractive to those who require a portable fire to harmonise with modern furnishings.



The Ferranti "Glowera" fire in two different forms

A Wind Speed and Direction Indicator

For indicating or recording in any situation, or number of situations up to ten, the velocity of the wind in ft. per sec. and its direction in degrees, MESSRS. ELLIOTT BROTHERS (LONDON), LTD., Century Works, Lewisham, S.E.13, have introduced an improved instrument which has the anemometer and wind vane combined in one unit, making for economy in space and a reduction in weight.

The transmitting unit of the new Elliott wind speed and direction indicator

The instrument is designed so that it is unaffected by cross eddies and gusts of short duration. The anemometer will operate at a minimum wind speed of 5 ft. per sec.; at this speed the direction indication is within 5 degrees; at higher speeds, however, the direction indicated may be relied upon within 2 degrees. An electrically operated brake is fitted which prevents the fan rotating when indications are not required, and minimises wear on the anemometer and transmitter.

The anemometer fan drives a magneto generator, the voltage of which is proportional to the speed of rotation. The d.c. supply for this generator is collected by means of sliprings and conveyed to the terminal box and from thence to the wind speed receivers. The direction transmitter is secured to the bracket by means of a gland nut, which can be partially unscrewed to enable the transmitter to be turned round relative to the bracket. This adjustment is necessary when first "lining up" the instrument after installation.

The electrical components, which constitute the receiving units of the equipment, are the same as those adopted for previous models and have thus been well tested in actual service. Indicators or recorders up to ten in number, for both wind speed and direction, may be used in conjunction with the one transmission unit.

The electrical indicators can be supplied with or without illuminated dials, but when these are required a 20-V lighting supply must be connected to each receiver; in addition to the lighting supply a separate 20-V supply is required for operating the wind direction receivers. Recorders can be provided.

Lanterns for Gas-discharge Lamps

We understand that the ENGINEERING & LIGHTING EQUIPMENT CO., LTD., Sphere Works, St. Albans, has brought out two new types of lantern for gaseous-discharge lamps. The "Highway" pattern is designed for two-way directional lighting. The top is of cast iron, the canopy of copper and the frame of brass with glazed diffusing panes. Silvered glass top reflectors are used, and opal plates in the lower ones. A conversion set is available, and also a fitting known as the "Vapoura," the glassware of which is rippled opalescent: it is claimed that the glass has a definite effect in correcting the colour from the gas-discharge lamp.

Electric Circulators

The Hotpoint-BTH electric circulators, both of the automatic and non-automatic type, are manufactured at the Rugby works of the British Thomson-Houston Co., Ltd., and are sold by the HOTPOINT ELECTRIC APPLIANCE CO., LTD., 24, Newman Street, Oxford Street, London, W.1, with loadings of either 2 kW or 3 kW.

The automatic circulators have one element thermostatically controlled, and the non-automatic circulators have two elements, making them suitable for three-heat control.

An automatic d.c. circulator with the cover removed

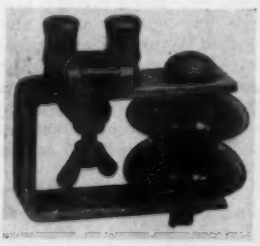
The automatic circulator consists of a heating element of the "Torribar" type, connected to a brass head which carries the thermostat and circulating tube. The thermostat fits into a pocket which screws into the head, making a joint with a copper-asbestos washer. Both this joint and the one between the element and the head are pressure-tested during manufacture to ensure that there is no danger of leakage during service.

Installation is quite simple. For use in copper tanks a sweating ring is provided so that it can be sweated into a circular hole in the tank, and the circulator is screwed home. It is equally easy to install the equipment in a galvanised tank by means of the flange and nut available for the purpose. After the hole has been cut in the tank the flange is passed through, a soft washer is fitted inside and outside and the nut screwed on from the outside. The circulator can then be screwed into position and is ready to be used.

The units range in steps of 2in. from lengths of 18in. to 30in., and an equipment 36in. long is also being manufactured. The prices of the automatic model range from £4 10s. to £6 15s.

A Running-out Block

The running out of conductors on pole lines is generally performed by using snatch blocks at each of the poles concerned. The likelihood of damaging the conductor by running out and the use of softer materials for the conductor led to modifications in the design of the blocks by the introduction of roller bearings, lignum vitæ sheaves and, in some cases, the use of wood for the body of the block itself.



The "Dinkie" running-out block

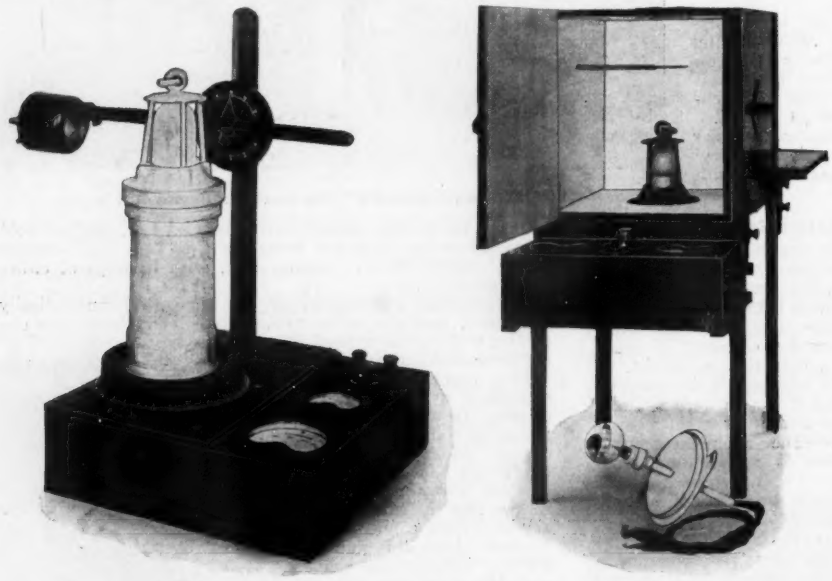
With all these precautions, however, the conductor is liable to be damaged, especially at points where the route deviates from the straight line. The "Dinkie" block, as illustrated, is claimed to be much lighter and cheaper than a snatch block. It is more readily attached and detached from the cross arm and provides a rolling surface for the conductor in both a horizontal and vertical plant. It is obtainable from MR. C. F. STREET, M.I.E.E., 70, Victoria Street, Westminster, S.W.1.

Testing Miners' Safety Lamps

New light-measuring equipment

THE recently issued Coal Mines General Regulations (Lighting), 1934, have made the possession of a reliable photometer a necessity for the colliery manager. In these Regulations it is not only stipulated that all safety lamps shall be of an approved pattern (Regulation 1), but that they shall be maintained and used in such a manner as to secure their lighting performance in service (Regulation 3).

It is further required (First Schedule) that at the end of nine hours' continuous burning the mean spherical candle-power shall not be less than 0.4 candle for cap lamps, or 0.75 candle for other types, and that the average candle-power over the horizontal angle of distribution shall not be less than 1.5 candles. Moreover, the candle-power must be not less than 1.0 at any point within a solid angle of 100 deg. in the case of cap lamps, or 180 deg. horizontally and 25 deg. vertically (up and down) in the case of all other patterns.



A directional candle-power photometer (left) and a mean spherical candle-power photometer with additional bulb holder

To enable tests to be made, Messrs. Everett, Edgcumbe and Co. have developed two distinct forms of photometer. In order to show compliance with both the mean spherical and directional candle-power limits—that is, for the complete testing of a new type of lamp—both forms are really essential, but the mine manager, who will be using lamps which have been already approved, need only ensure that their efficiency is maintained, and for this purpose the directional pattern will probably meet all requirements.

A Directional Photometer

This pattern embodies a photo-voltaic cell, mounted in a cup-shaped enclosure, which requires no battery or other accessories. A direct-reading meter scaled from 0 to 6 candle-power is enclosed in the base, and immediately the lamp is put in place the pointer records the correct candle-power reading. The arm carrying the photo-electric cell is so pivoted that the latter can be swung through any desired angle and measurements made at all points within the prescribed vertical angles of 50 deg. (hand lamps) or 100 deg. (cap lamps). The support for the safety lamp takes the form of a turn-table carrying a scale graduated in degrees, so that it can be at once determined whether the requirements of a mean candle-power not less than 1.5 candles and a minimum of 1.0 candle at any point are being complied with.

Being of the direct deflectional pattern, no skill is necessary in the use of the photometer, and the sensitive cell is so well shielded from stray light that it can be used in obscured daylight. In order that the readings of the photometer may be checked at any time, a standardised lamp bulb is supplied with each photometer, together with a conveniently mounted lamp-holder to carry it. Should the reading of the instrument not agree with the marked candle-power of the standardised lamp, any required adjustment can be instantly made by moving the photo-electric cell towards or away from the lamp.

The candle-power of an electric lamp is very sensitive to even small changes of voltage. For example, a fall from 2 to 1.9 V is accompanied by a diminution of nearly 20 per cent. in the candle-power. It is essential, therefore, that the voltage applied to the terminals of the standardised lamp shall be accurately adjusted, and for this purpose the addition of a self-contained voltmeter and regulating resistance is recommended. These are mounted just behind the candle-power meter.

While this photometer is all that is absolutely essential for the mine manager, since the mean spherical candle-power of the lamp is rather a question of design than of maintenance, it is clearly necessary for the lamp manufacturer to be able accurately to determine the mean spherical candle-power. Also, the larger collieries will probably wish to be able to do likewise in order that they may compare the relative merits of new patterns of lamp submitted to them. The apparatus enables a complete polar curve of the safety lamp to be obtained, and from this the mean spherical candle-power can be calculated, if necessary, although it is a somewhat laborious process.

Mean Spherical C.P.

The new direct-reading mean spherical candle-power photometer is also of the photo-electric pattern, and consists essentially of a cubical enclosure having a highly reflecting internal surface, a photo-voltaic cell being fixed behind ground glass in one of the walls. The cell is connected to a direct-reading meter, scaled from 0 to 5 mean spherical candle-power (or from 0 to 60 lumens, if preferred).

Directly the safety lamp is placed in the photometer the instrument indicates its mean spherical candle-power direct without calculation. This photometer can be used equally well for testing bare lamp bulbs, and for this purpose it is provided with a lampholder which can be inserted in place of the miners' lamp. The lampholder also affords a ready means of checking the accuracy of the photometer at any time, a standardised bulb being supplied for the purpose. Any necessary re-adjustment can be at once made by means of a shutter working over the face of the photo-electric cell. For accurate voltage adjustment at the lamp terminals the inclusion of a voltmeter and regulating resistance is recommended.

The instrument is also available for measurements on cap lamps, inspection lamps, or any others which give a more or less concentrated beam. For testing such lamps an opening is provided in one of the sides just over the adjustable shelf upon which the inspection lamp may be placed. Each of the photometers is equally suitable for the testing of flame lamps as of electric lamps, and when comparing the directional photometer with other types it is claimed as a great advantage that the lamp itself need not be moved about during the test.

An Indian Electrical Dispute

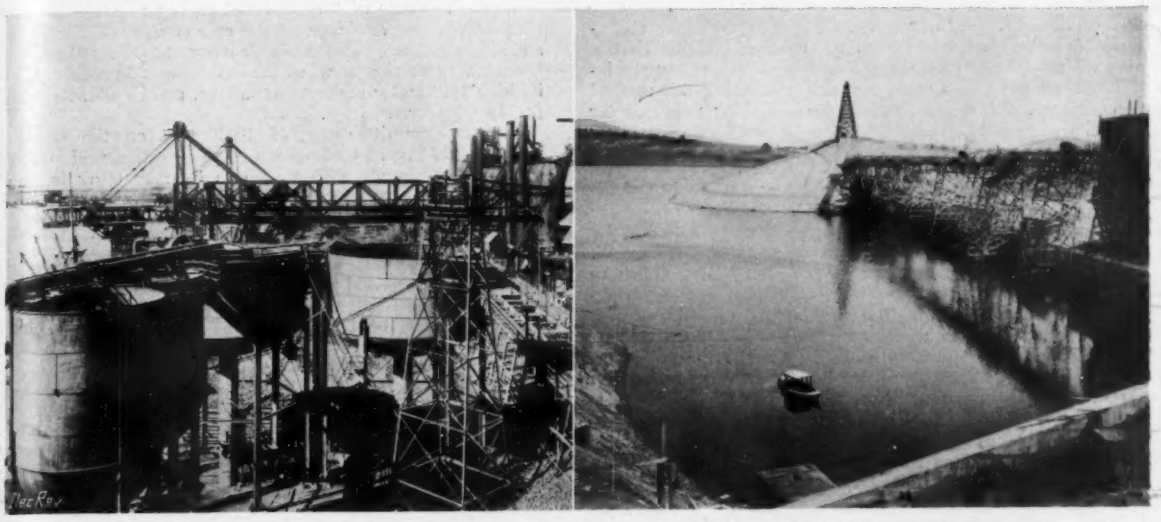
FOR some time past the question of charges by the Lahore Electric Supply Co. has been the subject of consideration by the Lahore municipal authorities, and endeavours have been made to secure a reduction. According to *Indian Engineering* this dispute recently assumed such menacing proportions that the company threatened to cut off the supply to the public and the Government of the Punjab had to promulgate Section 144 of the Criminal Procedure Code which vests the Government with power to issue orders absolute at once in urgent cases of nuisance or apprehended danger. The Punjab Government is now contemplating legislation to provide for action in such an emergency. In the meantime a general and appreciable reduction in the near future in the scale of charges which they have to pay for their supplies of electrical energy has practically been assured to the residents of Lahore. The reduction will follow the recommendations of the Lahore Electricity Rates Advisory Committee, the report of which has been under the consideration of the Punjab Government for some months.

The Situation in Australia

Readjustment and improvement

IN his latest report on the economic and trade conditions in Australia, Mr. R. W. Dalton, C.M.G., Senior Trade Commissioner in Australia*, states that during the past year Australia has enjoyed conditions favourable to an improvement in the general outlook, and general trading conditions show some improvement both locally and externally. Throughout producing and trading circles there has been a general readjustment to new conditions. This may not have gone as far as it could go, but it is clear from trading accounts that companies have been cutting costs and generally adapting themselves to their markets. In the process real wages have declined considerably, cost of living has fallen from its previous high level, and now unemployment has materially declined.

Total imports have shown a tendency to decline during the past year and it is very doubtful if the current trading year, or perhaps the next, will show any appreciable increase. Mr. Dalton reminds United Kingdom exporters that the imports of the ten years preceding the depression were entirely abnormal, and that an increase to anything like the former level need not be anticipated, probably for many years, and it is doubtful if much increase from the existing level can be anticipated in the near future. He points out that local manufacturers have had an opportunity in the market, since the depression, which they have never previously had, and as a result have been able to consolidate their position to such an extent that the channels for trade have probably been permanently altered. Production has developed in new lines formerly imported, and distributors and the public have also become accustomed to dealing more and more in locally produced goods. Consequently it may be difficult, and in many cases impossible, for manufacturers overseas to recover trade which they may consider has been lost only for the period of the depression.



Left: The Broken Hill Steel Works, Newcastle, N.S.W. Right: The Hume Weir, New South Wales

The Manufacturing Industries

There has been a steady decline in the activities of manufacturing industries in the last three years, and although there has been greater activity again recently, it is doubtful if that will be reflected in the figures for 1932-33 when they become available. It has been pointed out in previous reports that such development as has taken place in secondary industries has been in small-scale production rather than in large works, and in 1931-32 this condition became even more noticeable.

During the last two or three years economic conditions have forced on secondary industries the necessity for cutting down costs as much as possible and maintaining sales at a maximum. The home market has been almost entirely reserved to local industry for those goods which it was at all able to produce. To this end the exchange rate alone has been an important aid. In fact, it has been established that in many industries local manufacturers, with the assistance of exchange, would be in a position to underquote suppliers of imported goods without any tariff protection at all. The chief difficulty which local industries have to face is that high cost of production makes it impossible for most of them to hope to compete in overseas markets, and consequently their output is fixed by the limits of a small consuming market.

The report analyses the import trade of Australia in 1931-32, and a section is devoted to machines and machinery (including electrical apparatus). The imports in this class have fallen away seriously during the last three years, the total in 1931-32 being only £2,651,158, as compared with £6,112,823 in 1930-31 and £14,286,624 in 1929-30. A slight increase occurred in 1932-33, but the total was still only £3,434,176 in that year.

Corresponding declines have naturally occurred in the value of imports from the United Kingdom, which, however, fairly well maintained its share in 1931-32, as compared with 1930-31, and in some instances secured an increase. An outstanding item in the class in which the United Kingdom did not maintain her position was wireless valves, the total imports of which actually increased from £210,576 in 1930-31 to £236,161 in 1931-32, whilst the share of the United Kingdom declined from £69,971 to £32,543, to the advantage of both the Netherlands and the United States. In wireless receivers and parts also the United Kingdom's share fell from 22 per cent. to 17 per cent. in the same period, whilst in electrical appliances not specially enumerated the fall was from 41 per cent. to 27 per cent. The following table gives details of the imports of electrical apparatus in 1931-32 of those items in which competition was at all considerable, and shows the United Kingdom's share :—

	Total Imports	Total from U.K. £
Batteries and accumulators (other than large storage batteries)	10,849	5,339
Electric motors under 1 h.p. when not integral parts of machines	18,011	4,987
Electric fans	2,709	1,190
Electric heating and cooking appliances ...	7,489	1,788
Electric filament lamps	94,576	41,485
Electric measuring and recording instruments...	27,417	11,089
Electric regulating, starting, &c., apparatus ...	40,789	21,603
Static transformers exceeding 150 kVA and induction coils n.e.i.	1,022	657
Vacuum tubes	23,050	5,042
Valves for wireless	236,161	32,543
Wireless receivers and parts	64,679	10,972
Electrical appliances n.e.i.	125,990	34,009

Miscellaneous

The Tariff Board continued to work at high pressure during the year, and, in addition to an exhaustive report on the effect of exchange and primage duties on the protective level, has submitted a large number of reports on individual items of the tariff, on deferred duties and on questions affecting the admission of goods under bylaws.

The Board has also dealt with a number of applications for review of tariff items in accordance with the Ottawa Agreement. In the last respect the services of the Australian Association of British Manufacturers have been of considerable value to United Kingdom interests.

As a result of agitation which has blamed the Government for not proceeding more rapidly with tariff reduction, a new representative body has been formed—the Federal Tariff Reform Organisation. This is committed to urge the Government further to reduce the tariff in the interests especially of the primary producing sections and of the purchasing community.

It was reported during the year that the Government proposed to terminate its agreement for overseas telegraphic communications with Amalgamated Wireless (Australasia), Ltd. The company was asked to submit a scheme for such termination, but after consideration decided not to do so.

Contracts were let during the year for four new regional broadcasting stations at Townsville, Sale, Grafton and Launceston, and for three new stations to be installed in the South West of Western Australia, in the West of Victoria and in the West of New South Wales. Notice was given to terminate the agreement with Amalgamated Wireless (Australasia), Ltd., whereby it received 3s. from each licence fee for patent rights, and the Postmaster-General announced that licence fees would probably be reduced by 3s. from March, 1934. The number of listeners' licences in existence on December 31st, 1933, was 518,628, an increase of 99,448 as compared with the previous year.

*Published by the Stationery Office for the Department of Overseas Trade. Price 4s. 6d. net.

Boosting the Electric Vehicle

Preparing for the campaign

REFERENCE has already been made in the ELECTRICAL REVIEW to the reorganisation of the Electric Vehicle Committee to promote the interests of the British electric vehicle industry. It will be remembered that the Committee has been in existence for many years, and its duties were ultimately transferred to the care of the Electrical Development Association.

The Committee has now been reorganised, and steps are being taken to "support the revival of interest in the lighter type of electric vehicle."

During the coming autumn months a joint direct-mail campaign with E.D.A. and with the assistance of the electricity supply industry, among possible users of the modern light electric vehicle, will be carried out. The objective of this campaign is to add very largely to the number of light electric vehicles in use and to secure that the electricity supply industry shall itself set a good example by adopting this method of transport. An electric vehicle film is being produced for publicity purposes.

Formed Twenty-one Years Ago

The Committee was formed in 1913 under the auspices of the I.M.E.A., with Mr. E. E. Hoadley, of Maidstone, as honorary secretary. At the end of 1925 it became affiliated with the British Electrical Development Association. Mr. J. W. Beauchamp, who was the director at that time, acted as honorary secretary, while the Association provided the necessary secretarial assistance. The same arrangement holds good to-day, Mr. A. C. Cramb, director and secretary of E.D.A., being honorary secretary, with Mr. R. L. Acland (E.D.A.) as acting secretary. The Committee has its own separate funds vested in trustees appointed by itself.

As it was realised that under such conditions members of the Committee were not protected by the incorporation of E.D.A., it was decided to form the Committee into a company limited by guarantee, having no share capital and not operating for profit. The new registration is the result. Among the associations who are appointing representatives as members of the Committee are the electricity supply associations, the B.E.A.M.A., the E.C.A., manufacturers of electric vehicles, the Commercial Motor Users' Association, the Society of Motor Manufacturers and Traders, the Institute of Public Cleansing, and other organisations and interests set out below.

An "electric" put into service by the Chloride Co. twenty years ago. It is a one-tonner built by the General Vehicle Co., Ltd.

An Electricity Charges Sub-Committee was appointed consisting of representatives of the four electricity supply associations, with the late Mr. A. W. Blake (representing the I.M.E.A.) as chairman. A report and recommendations which received the approval of the main committee was submitted to and adopted by each of the electricity supply associations to whom it was forwarded, and it is hoped that a considerable advance has been made towards more equitable tariffs in different parts of the country for electricity supply for charging electric vehicles.

Report on Electricity Charges

The Electricity Charges Sub-Committee which reported in February last was appointed to investigate the possibility of arranging a standard set of charges throughout the country for electricity supply, connecting up, &c., for charging electric vehicles. In its report it dealt first with the prospective demand. It received from manufacturers of electric vehicles much useful information and evidence of an increasing demand for the lighter models to take the place of petrol vehicles, horse-vans and hand-carts, more particularly in the daily delivery of bread, milk, fruit, vegetables, groceries, &c., for which duties the electric vehicle is most suitable, owing to the frequent stops entailed. Evidence was also submitted indicating that a definite reduction in operating costs is secured with electric vehicles as compared with petrol-driven vehicles of similar capacity owing to the longer life and low cost of repairs.

Manufacturers estimate that, provided suitable tariffs and facilities for charging can be arranged, 5,000 light electric delivery vans should be on the road within the next two years; 30,000 within five years; and 100,000 within ten years. A moderate estimate of the electrical energy required by 5,000 of such vehicles would be at the rate of 20,000,000 kWh per annum, which is a most desirable off-peak load for the supply undertaking at a time when load is difficult to secure, while its high load factor makes it attractive, and should, therefore, justify a preferential tariff.

The Sub-Committee satisfied itself that on the score of health, economy and convenience, the electric vehicle could successfully compete with vehicles driven by other forms of energy when employed on local delivery, particularly the horse-drawn van; and it expressed the opinion that, given facilities and suitable tariffs, a considerable demand for electric vehicles was likely to arise in many parts of the country, which would bring increased business to supply undertakings.

It recommended that all electricity supply authorities should be requested to support the efforts of the Electric Vehicle Committee in the following manner:—

(a) By agreeing to offer a special off-peak tariff for charging the batteries of electric vehicles. It is considered that ½d. per kWh should generally give a fair margin of profit, and that the rate should not exceed 1d. per kWh.
(b) By offering a special tariff for charging the batteries of electric vehicles during other than off-peak periods.
(c) By the use of electric vehicles for all suitable purposes, thus demonstrating the hygienic qualities and silent operation of this class of vehicle.
(d) By encouraging the provision of facilities for battery charging within their area of supply.
(e) By including in their published tariffs a reference to such supply.

The Registration

The following is a copy of the registration notice which was filed at Somerset House on August 4th. The Committee is a company limited by guarantee, without share capital. The number of members is declared to be fifty, each liable for not more than £5 in the event of winding up. The objects are to promote, develop and protect the electric vehicle industry and enterprise in the British Empire, &c. The undermentioned associations, trading bodies and persons are to appoint representatives to the number indicated against their respective names:—

Incorporated Municipal Electrical Association (3).
Associated Municipal Electrical Engineers (1).
Incorporated Association of Electric Power Companies (1).
London Electricity Supply Association (1).
Provincial Electric Supply Association (1).
British Electrical & Allied Manufacturers' Association (4).
Electrical Contractors' Association (1).
Commercial Motor Users' Association (2).
Tramways and Light Railways Association (1).
Society of Motor Manufacturers and Traders (1).
Institute of Public Cleansing (2).
General Vehicle Co., Ltd. (1).
Electricars, Ltd. (1).
Wingrove & Rogers, Ltd. (1).
Metropolitan-Vickers Electrical Co., Ltd. (1).
Ransomes, Sims & Jefferies, Ltd. (1).
A. E. Morrison & Sons, Ltd. (1).
Partridge, Wilson & Co., Ltd. (1).
Nelco, Ltd. (1).
Mr. A. M. Robertson (1).
Mr. O. W. Taylor (1).
Mr. H. W. Tomlinson (1).

The income and property of the Association, whencesoever derived, are to be applied solely towards the promotion of its objects. The subscribers are: J. B. Osler, 8, Macclesfield Street, E.C., chief engineer, Carter Paterson & Co., Ltd.; E. S. New, 50, Grosvenor Gardens, S.W.1, managing director; Guy D. Ozanne, 188/9, Strand, W.C.2, manager; A. J. Fippard, 11, Tothill Street, S.W.1, chartered electrical engineer; F. W. Crawter, Bryn Cottage, Warlingham, Surrey, chartered electrical engineer; A. W. Barham, Lindisfarne, Langley Road, Watford, general manager, Watford Corporation Electricity Department; A. L. Trundle, 63/81, Pelham Street, S.W.7, manager. "The management and control shall be vested in all the members or their representatives." Remuneration of any member, officer or servant as determined in general meeting. Solicitors: Rexworthy, Barnard & Bonser, 83, Cannon Street, E.C.4.

Business and Industrial Notes

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations and Failures

Electric Vehicles in Ireland

In order to meet the new import duty and taxation conditions in the Irish Free State which encourage the importation of motor components rather than complete motor vehicles, the Electrical Transport and Equipment Co., Ltd., of Dublin, has recently completed arrangements for the assembly in the country of the electric delivery vehicles built by Electricars, Ltd., Birmingham. The Irish-assembled vehicles are being equipped with Drumm batteries.

Aldershot's Imposing Showrooms

Prominently and centrally situated, the new showrooms of the Aldershot Electricity Department are of imposing appearance. The building, which was recently opened, is of fire-proof construction, being steel-framed with reinforced concrete floors and roof. The elevation is of artificial stone to the first floor, and the upper part is of multi-coloured hand-made bricks with artificial stone cornices and dressings. There are four large display windows with bronze metal frames and polished "Bon Accord" granite risers and plinths to pilasters. The main entrance is at the corner of the two roads, with a second entrance in Station Road into a lobby from which there are swing doors to the main showroom and a fairly wide staircase finished in terrazzo with metal balustrading and oak handrail leading to the first and second floors. The main showroom occupies the greater part of the ground floor, has an oak-block floor and oaken panelling to walls and window enclosures, while the cash and inquiry desk, showcases, and all other joinery work are of the same wood. On the first floor there is a demonstration room and kitchen, and also the offices of the chief engineer and showroom manager. The second floor is occupied by the general offices, showroom store, &c., and there is a staircase for access to the flat roof. A large basement extending over the greater part of the site has been provided for use as a sub-station, and the walls are faced with Midhurst white bricks. The contractors for the showrooms were the Public Works & Construction Co., Ltd., with the following firms as sub-contractors: E.h.p. switchgear, Switchgear & Cowans, Ltd., Manchester; transformers and electrical fittings, the G.E.C.; l.p. switchgear, Berry's Electric, Ltd., London; l.p. fusegear, W. T. Henley's Telegraph Works Co., Ltd.; fire protection apparatus, Walter Kidde & Co., London; electrical heating, Barker, Young & Co., Welwyn Garden City; electrical wiring, Burch & Vertue, Ltd., Aldershot. The architect for the building was Mr. H. G. Baker, L.R.I.B.A., F.S.I., of Aldershot. Mr. Fredk. Garside is the borough electrical engineer.

The recently opened showrooms of the Aldershot Electricity Department (left) and a demonstration room

F.B.I. Mission to Manchoukuo

The Federation of British Industries has decided to send an industrial mission in the immediate future to Manchoukuo for the purpose of studying conditions in that country and of ascertaining whether British industry can co-operate with local interests in its development. A short visit of courtesy and goodwill will also be made to Japan with the object of establishing friendly contact with the representative organisations of Japanese industry and commerce. The mission will be composed of the following members: Col. Lord Barnby, past president of the F.B.I.; Sir Charles Seligman, senior director of Seligman Bros., Ltd., bankers, vice-chairman of the Commercial Union Assurance Co., and director of the National Discount Co.; Mr. G. Locock, director of the F.B.I.; and Mr. J. Piggott, representing the British Iron and Steel Federation.

Railway Rates

Under the Road and Rail Traffic Act of 1933, railway companies, subject to the consent of the Railway Rates Tribunal, may make "agreed charges" for the carriage of goods and are thus able to quote flat or composite rates to a trader, calculated on a basis other than that of a charge per ton mile. A Traders' Protection Association has therefore been formed to protect traders whose businesses will suffer as a result of the new powers in relation to railway rates. It will also advise road hauliers and road goods vehicle operators generally, and in particular assist them in obtaining licences under Part I of the Act. Full particulars of the Association's objects and membership subscription can be obtained from the secretary, 37, St. Nicholas Street, Bristol.

The Ever Ready Co. in Australia

A new company registered in Sydney is the Ever-Ready Company (Australia), Ltd., with a capital of £250,000, to acquire the undertaking in Australia of the Ever-Ready Company (Great Britain), Ltd., and to carry on the business of manufacturing and dealing in dry cells, dry batteries, &c. The directors are Messrs. R. P. Walter, A. Jewell, and S. W. H. Newman.

Italian Foreign Electrical Trade

A return just to hand shows that the Italian imports of foreign electrical machinery and apparatus during the four months to May last attained a value of £524,490 (assuming 60 lira to the £) as compared with £552,900 in the corresponding four months a year ago. During the same period there was also a decrease in the exports of similar material from Italy from £246,865 to £206,735.

Control of Appliances in Victoria

Specimens of cheap and dangerous electrical appliances were shown in the Victoria Legislative Assembly when the chief secretary, Mr. Macfarlan, spoke on the second reading of the State Electricity Bill. On the table in front of him were electric grillers, toasters, water-heating jugs, and electric toys, which Mr. Macfarlan described as being as cheap as they were dangerous. If the Bill were passed, he said, the Electricity Commission would have power to enforce standards of safety for all electrical appliances sold in the State. Since 1918 the number of consumers had increased by 240 per cent., and the number and variety of new electrical appliances introduced in the same period was also very great. For the protection of the public against faulty apparatus and inefficient work in installations it was essential that there should be one authority. The Bill would amend and bring up to date the present regulations, deal with the licensing and registration of elec-

trical contractors and mechanics, empower the Commission to prescribe classes and types of apparatus that could be sold, and to define the quality of materials used in installations. Quoting an expert's report on an electric toaster sold at 2s., Mr. Macfarlan said it was of weak construction with a frame of inflammable wood. A member suggested that the articles were made in Japan, and another stated that the toaster was made in Victoria. Mr. Macfarlan also referred to a water jug sold at 2s. and a toy electric iron which were very cheap and very dangerous.

The Ship Carbon Co.

In our "Company Liquidations" section notice is given of the voluntary liquidation of the Ship Carbon Co. of Great Britain, Ltd., for the purpose of amalgamating with a new company of the same name which will discharge the debts, liabilities and obligations of the liquidated company. It is also notified that the United Ebonite Manufacturers, Ltd., is to be wound up and is to sell its lands and buildings to the Ship Carbon Co. for the sum of £13,500 in cash. The Ship Carbon Co. will also discharge this company's debts and liabilities in accordance with an agreement which has been arrived at. The liquidator of United Ebonite Mfrs., Ltd., is authorised to divide all or any assets of the company among the members "in specie."

The Next Illumination Design Course

The Illumination Design Course which is being arranged by the Lighting Service Bureau in London during the autumn is the thirtieth of the series. It will open on October 15th with a survey of the potentialities of the lighting market by Mr. W. J. Jones, manager of the Bureau, and the chairman of the E.L.M.A. Council, Mr. C. H. Cox, will take the chair. The discussion will be opened by Sir William Ray, executive chairman of the British Electrical Development Association. On October 22nd the subject will be "Lighting Fundamentals and Illumination Design," by Mr. J. W. Howell, and the discussion will be opened by Mr. J. S. Dow, secretary, Illuminating Engineering Society. On October 29th Mr. B. P. Dudding will deal with "The Characteristics and Functions of Modern Electric Lamps," and the discussion will be opened by Mr. H. Marryat, president, Electrical Contractors' Association. The subject for November 5th is "The Lighting Requirements of Commercial Buildings," by Mr. E. B. Sawyer. On November 12th Mr. H. Lingard will lecture on "Floodlighting Practice in Commerce and Industry." Brigadier-General R. F. Legge, C.B.E., general manager, British Power and Light Corporation, will open the discussion. At the final meeting on November 19th the subject will be "The Value of Light Design in Architecture," by Mr. R. O. Sutherland, A.R.I.B.A., and the discussion is to be opened by Mr. H. T. Young, vice-president, Institution of Electrical Engineers.

Ironmongers and Fair Trading

Consideration was given by the Liverpool Ironmongers' Association at its meeting on August 9th to the Fair Trading Agreement for the electrical industry. A plea was made for the representation of the ironmongery trade on the council and for the granting of factors' terms to ironmongers.

A Hungarian Electrical Cartel

After protracted negotiations the four Budapest factories making electrical goods have concluded an agreement the first effect of which will be to raise prices, which have for a long time been altogether inadequate, says *Reuter's Trade Service*, quoting a telegram to the Düsseldorf *Deutsche Bergwerks Zeitung*. A provisional increase of 10 per cent. has been made and is coming into force at once. Before the end of this month it is intended to supplement this agreement by an undertaking regarding the volume of production and to include in the price arrangements the twenty-five wholesale traders in electrical goods in Hungary.

Parsons's Activities

A 20,000-kW turbo-alternator built by Messrs. C. A. Parsons, Ltd., Heaton, Newcastle-on-Tyne, for the East Rand Mines, South Africa, has been completed and shipped by the s.s. *Dunbar Castle* to its destination. The plant weighs 250 tons. Messrs. Parsons have also received an order for another turbo-alternator of similar size to be erected on the Salt River near Capetown.

They have also completed two stators for Swansea. Each weighs 75 tons and on August 19th one will be taken by special train to Woodford and the following Sunday will complete its journey to Swansea. The second stator will follow two or three weeks later.

Czechoslovakian Electrical Trade

The *Board of Trade Journal* states that during the first half of the current year Czechoslovakia imported electrical machinery and apparatus to the value of 62,541,000 cr. as compared with 66,844,000 cr. in the corresponding period of 1933.

The first half of the current year has seen a welcome change in the tendency of trade between Czechoslovakia and England. The sharp decline registered in 1932 and 1933 has given place to a recovery not only in the total volume of trade but also in a surplus of exports. The share of the United Kingdom in Czechoslovakian exports of electrical machinery and apparatus amounted to 1,109,000 cr. in the first six months of this year, against 1,132,000 cr., thus showing a slight decline. Imports into Czechoslovakia from England of this class of goods also decreased in value—from 2,710,000 cr. to 2,428,000 cr.

A contract has just been awarded for the construction of what will be Czechoslovakia's largest electric power station. The scheme will cost 120 million crowns, of which 11 millions is to be contributed by the Waterways Fund. The power station will be erected on the River Vah in Slovakia between Ladce and Puchov.

Permits for the import into Czechoslovakia of wireless telegraph and telephone apparatus (tariff item 540) will for the future be granted only for such apparatus as is not manufactured in Czechoslovakia. The fee for such permits is 5 per cent. of the price of the imported articles.

The Marking of Miners' Lamp Bulbs

Under the provisions of No. 4 of the Coal Mines General Regulations (Lighting), 1934, the Board of Trade has made an Order prescribing an alternative manner of marking bulbs of approved types. For types of bulbs as regards which the Board is satisfied that the space available on the cap is insufficient for the whole of the marking required by the Second Schedule to the Regulations, the mark referred to in clause (iii) of the Schedule shall be applied to the glass by etching or other distinct and indelible means. The Order is to come into force on September 1st (the Lamp Bulbs (Marking) Order, 1934).

An Alleged Breach of Contract

Sheriff More, Banff, on August 11th issued his decision in an action for alleged breach of contract brought by Mr. John Keene, electrical engineer, formerly of New Jersey, U.S.A., and now residing at Stoke-on-Trent, against Messrs. MacDonald Brothers, engineers, Portsay. Plaintiff alleged that he was induced by Mr. W. H. MacDonald, who was for some time resident in New Jersey, to give up his appointment there with the Westinghouse Lamp Co., where his salary was $225 per month, and go to Portsay and put his electrical knowledge at the disposal of respondents in return for an appointment as manager of their electrical department at a wage of not less than the equivalent of $225 per month.

The defence was a denial of any such contract, and it was alleged that plaintiff and Mr. W. H. MacDonald agreed to return to England and set up business as electrical engineers quite apart from the business of MacDonald Brothers. The Sheriff found that Mr. Keene had failed to prove his case, and considered that he had arrived at a most unreasonable conclusion as to the size and importance of Portsay as a business centre for the development of an electrical concern.

Local Exhibition

The Shropshire, Worcester, and Staffordshire Electric Power Company, in conjunction with Messrs. Greenland, a well-known Hereford firm of furnishers, is bringing the advantages of electricity in the home before Hereford housewives in convincing manner by staging an "ideal home" exhibition at the Hereford Garden City between August 8th and 29th. The companies have furnished and entirely fitted out a small, semi-detached house throughout with electrical fittings and furniture of modern design, and already, during the first few days of the exhibition, the house has been visited by hundreds of men and women from Hereford itself and the surrounding district.

Trade Announcements

Messrs. Johnson & Phillips, Ltd., have appointed Messrs. Wm. Coulthard & Co., Ltd., Crown Works, Crown Street, Carlisle, as their agents in the county of Cumberland. A full stock of "J. & P." cable is available in that area, also any engineering service.

Pifco, Ltd., has removed to larger premises at Pifco House, Shudehill, Manchester. The telephone numbers remain unaltered—City 4044 and 0831 (Manchester).

For Sale

Eastbourne Corporation Electricity Department invites offers for twenty-four air-cooled transformers.

The Salford City Electricity Department invites offers for the purchase of d.c. meters.

(See our classified advertisements.)

Electricity in the Mining Industry

Reference to the increased use of electricity in pits in Northumberland and Durham is made in an article in the monthly *Journal* of the Newcastle and Gateshead Chamber of Commerce under the heading "The Development in the use of Electricity in the North-East." It is stated that negotiations have been completed by the North-Eastern Electric Supply Co., Ltd., to provide further electricity supplies for colliery purposes, and these will be available as soon as constructional arrangements, now in hand, are completed. During the past three years the supply company has entered into arrangements with various colliery companies which have resulted in many thousands of horse-power of private generating plant, steam engines and boilers being closed down. In three years seventy-two colliery generating sets totalling 53,000 h.p. or 39 000 kW and 222 steam engines of 40,700 h.p. have been abolished. Thirty-seven winding engines have been electrified, and 250 steam boilers have been superseded. There are now

100 collieries completely electrified, thirty-five are completely electrified except for the winding engines, while forty-six are partially electrified. The article states that colliery owners generally agree that there are great advantages in the use of electricity for power purposes from the strictly technical and practical point of view. But the relative costs of providing their own power by whatever means is of major importance and is usually the deciding factor when considering electrification.

Recent Contracts

The Pioneer Health Centre, Peckham, is claimed to be the first establishment of its kind in the Empire to have an all-electric thermal storage space-warming, air-conditioning, swimming-pool warming and hot-water service plant. Messrs. James Combe & Son, Ltd., who recently completed the electrical plant at the Empire Pool and Sports Arena, Wembley, are to be responsible for the design and installation for this building to the instructions of the engineer, Sir E. Owen Williams, K.B.E.

Electrical Manufacturing in Holland

The Dutch Central Statistical Bureau has issued particulars of the production of electrical machinery and apparatus, excluding works which exclusively or mainly make radio apparatus and components or which manufacture wire and cables. The number of works (thirty-seven) was one fewer in 1933 than in the previous year. The value of the production declined from 11,876,000 fl. in 1932 to 10,725,000 fl. last year, and the turnover from 12,512,000 fl. to 10,987,000 fl. The number of persons employed on September 15th, 1933, was 3,716, as against 3,678 a year previously. In 1930 the value of the production and sales with the same number of works were more than twice those in 1933, and the number employed was larger at 5,754 persons.

Social Events

The Clesco Sports and Social Club (County of London Electric Supply Co., Ltd.) is holding its annual horticultural exhibition and garden party at the company's sports ground, Raynes Park, S.W., on August 25th.

Prices of Materials

The following prices are only general, and they may vary according to quantities and other circumstances :—

CHEMICALS, ETC.	Price. August 15th.	Fortnight's Inc. or Dec.
a Acid, Oxalic ... ... per cwt.	50s.	—
a Ammoniac, Sal ... ... per ton	£40	—
a Ammonia, Muriate (large crystal) ... ,,	£38	—
a Borax ... ... ,,	£17	—
a Copper, Sulphate ... ... ,,	£19 15s.	—
a Potash, Chlorate ... ... per lb.	3¾d. to 4¼d.	—
a ,, Perchlorate ... ... ,,	6d.	—
a Shellac T.N. ... ... per cwt.	£4 18s.	—
a Sulphur Commercial... ... ... per ton	£11	—
a ,, Roll	£11	—
a Soda Chlorate ... ... per lb.	3¼d. to 3¾d.	—
a ,, Crystals... ... ... per ton	£5 to £5 5s.	—
a Sodium Bichromate, casks ... ... per lb.	4d. nett.	—
METALS, ETC.		
b Aluminium, Ingots ... ... per ton	£100 to £105	—
b ,, Wire ... ... per lb.	1/1 to 1/9	—
b ,, Sheet and Foil... ... ,,	1/2 to 2/9	—
p Babbits Metal and Anti-friction Metals—		
Grade I ... ... per ton net	£205	£2 dec.
Grade II ... ... ,,	£140	£1 dec.
Grade III ... ... ,,	£67	£1 dec.
c Brass (rolled metal 2" to 12" basis)... per lb.	6¾d.	¼d. dec.
c ,, Tubes (solid drawn) ... ... ,,	8¾d. to 9d.	¼d. dec.
c ,, Wire, basis ... ... ,,	7¼d.	¼d. dec.
c Copper Tubes (solid drawn)... ... ,,	9¼d.	¼d. dec.
g ,, Bars (best selected)... ... per ton	£58	£2 dec.
g ,, Sheet ... ... ,,		
g ,, Rod ... ... ,,		
d ,, (Electrolytic) Bars ... ... ,,	£32 5s.	15s. dec.
g ,, ,, Sheets ... ,,	£32 to £32 5s.	5s. inc.
d ,, ,, Wire Rods ... ,,	£38	£3 10s. dec.
d ,, ,, H.C. Wire ... per lb.	6¾d.	¼d. dec.
f Ebonite Rod ... ... ,,	1/3 to 1/6 plus	—
f ,, Sheet ... ... ,,	1/3 to 1/6 10%	—
n German Silver Wire ... ... ,,	2/5	—
h Gutta-percha, fine ... ... ,,	nom.	—
h India-rubber, Para fine ... ... ,,	5¼d.	¼d. inc.
i Iron, Pig (Cleveland No. 3) ... per ton	62/6	—
i ,, Wire galv. No. 1, P.O. qual. ... ,,	£20	—
g Lead, English Pig ... ... ,,	£12 15s.	5s. inc.
g Mercury ... ... per bot.	£11/7/6 to £11/12/6	—
c Mica (in original cases) small ... per lb.	6d. to 3/6	—
e ,, ,, medium ... ,,	4/- to 8/-	—
e ,, ,, large ... ,,	8/6 to 17/6 & up	—
p Phosphor Bronze, plain castings ... ,,	1/1	—
p ,, ,, drawn bars & rods ,,	10¾d.	¼d. dec.
p ,, ,, rolled strip & Sheet ,,	10¼d.	¼d. dec.
p ,, ,, wire ... ... ,,	11¼d.	¼d. dec.
o Platinum ... ... per oz.	£7 15s.	—
d Silicium Bronze Wire ... ... per lb.	7¾d.	¼d. dec.
r Steel, magnet, in bars ... ... ,,	7¼d.	—
n Tin, Block (English) ... ... per ton	£230 15s. to £232 15s.	£1 dec.
g ,, Wire, Nos. 1 to 16 ... ... per lb.	3/8	—

Quotations supplied by :—

a G. Boor & Co.
b The British Aluminium Co., Ltd.
c Thos. Bolton & Sons, Ltd.
d Frederick Smith & Co.
e F. Wiggins & Sons.
f India-Rubber, Gutta Percha and Telegraph Works Co., Ltd.
g James & Shakespeare.
h Edward Till & Co.
i Bolling & Lowe.
l Richard Johnson & Nephew, Ltd.
n P. Ormiston & Sons.
o Johnson Matthey & Co.
p C. Clifford & Sons, Ltd.
r W. R. Dennis & Co.

The above table is published here fortnightly. In alternate issues, in which it does not appear, the latest prices of copper, silicium bronze wire, lead and rubber, up to the time of going to press, are given in our "Business Notes" under the same heading.

Midland Wholesalers' New Premises

Messrs. Durant & Willitts, Ltd., electrical wholesalers, have recently moved into modern and commodious premises at the Civic Works, Livery Street, Birmingham. This will enable the company to deal speedily and efficiently with its increased business.

Messrs. Durant & Willitts' new premises

New Catalogues and Lists

Philips Industrial, 145, Charing Cross Road, London.—A booklet by Dr. J. W. M. Roodenburg, of Wageningen Agricultural College, on "Red Light for Hothouse Plants" and a leaflet on neon plant irradiators.

Holophane, Ltd., Elverton Street, Vincent Square, London, S.W.1.—A leaflet on trough lighting units.

Contrasit Co. of Great Britain, Ltd., 109, Kingsway, London.—A booklet on belt slip showing the advantages of "Contrasit" pulley bandages.

A. Reyrolle & Co., Ltd., Hebburn-on-Tyne.—Leaflets on an immersion type compound heater, "Easigo" protected plugs and sockets, portable in-bye sub-station equipment, and multiple-way plug couplers.

Girling's, Ltd., Maldon, Essex.—A catalogue of "Mosaic" fires.

City Accumulator Co., Ltd., 18/20, Norman's Buildings, Central Street, London, E.C.1.—A catalogue of "Austin" radio receivers.

Marconiphone Co., Ltd., Radio House, Tottenham Court Road, London.—A broadsheet giving full details of the Marconiphone 1935 range of receivers.

Davis Electrical Co., 15, Percy Street, London, W.1.—A leaflet on the "Deco" transformer lamp.

Record Electrical Co., Ltd., Broadheath, Altrincham.—A leaflet describing a continuity tester.

G.W.B. Electric Furnaces, Ltd., Elecfurn Works, North Road, Holloway, London.—A copy of the "Sheil-Wild-Barfield" brochure.

General Electric Co., Ltd., Magnet House, Kingsway, London.—A copy of the 1934/5 "Osram" valve guide.

Bankruptcy Proceedings

M. Glanfield, trading as "The Broadway Radio," wireless dealer, 7, Broadway, London Road, Portsmouth.—The public examination was held on August 13th, at the Court House, Portsmouth, when the statement of affairs showed liabilities of £702 and assets of £68, leaving a deficiency of £634. The debtor, who attributed his position to heavy overhead charges, insufficient trade and competition, said that the profits during the first year were barely sufficient to cover the overhead expenses. During the next year competition increased, there being at one time five other wireless shops within a radius of half a mile. The examination was adjourned. At the first meeting of creditors held at the Official Receiver's office, 87, High Street, Portsmouth, the case, being a summary one, was left in the hands of the Official Receiver as trustee.

D. J. Watkins, wireless and electrical engineer, trading as Watkins & Son, 72, Victoria Road, Surbiton, Surrey.—The public examination of the above debtor was held recently at the Town Hall, Market Place, Kingston. The statement of affairs showed gross liabilities of £995, and a deficiency of £721. Debtor attributed his failure to reduction in the prices of wireless sets; lack of capital, and keen competition. The examination was adjourned for closing.

J. Drake, electrical and wireless contractor, 93, St. Leonards Road, Windsor.—Public examination, October 12th, at the Town Hall, Windsor.

A. C. Gardner, wireless dealer, 7, Midlands Road, Derby.—Trustee, Mr. L. A. West, 22, Regent Street, Nottingham, Official Receiver, released July 23rd.

H. B. Hydes ("Western Radio"), radio engineer, 71, Allerton Road, Liverpool.—Trustee, Mr. J. Allcorn, Victoria Street, Liverpool, Official Receiver, released July 23rd.

F. M. Clarke, electrical engineer, 3, Joyce Avenue, Sherwood, Nottingham.—Trustee, Mr. L. A. West, 22, Regent Street, Nottingham, released July 24th.

J. Liptrott, wireless dealer, 101, High Road, Beeston.—First and final dividend, payable August 18th, at 22, Regent Street, Park Row, Nottingham.

J. H. Dinham ("Electra Contracting Co."), electrical contractor, 50, New Zealand Road, Cardiff (separate application).—Application for discharge to be heard on October 10th, at the Law Courts, Cathays Park, Cardiff.

D. C. Hayes (trading at Birmingham as the "Streetsbrook Electrical Co."), 44, Burman Street, Shirley, Warwick, electrical

contractor.—Receiving order made August 3rd on debtor's own petition.

J. C. Law, Alma Villa, Mark, Somerset, electrical and radio engineer.—Receiving order made August 3rd on debtor's own petition.

C. E. Tong, 11, Edgware Road, Fulford Road, York, electrical engineer.—Receiving order made August 3rd on debtor's own petition.

L. E. Pearce (trading at Tunbridge Wells as "St. John's Electrical Co."), Ivy House Farm, Southborough, electrical engineer.—Trustee, Mr. A. E. Orbell, 6, Old Steine, Brighton, appointed August 7th.

W. H. Secker (trading as the "Modern Wireless Depôt"), 90a, Southwell Road, Norwich, wireless engineer.—Last day for receiving proofs for dividend August 25th. Trustee, Mr. C. B. L. Prior, Official Receiver, 4, Eastbourne Place, Prince of Wales Road, Norwich.

E. Widdowson (trading as "Widdowson Bros."), 11, Stodman Street, Newark-on-Trent, wireless, &c., dealer.—Last day for receiving proofs for dividend August 25th. Trustee, Mr. A. J. Rogers, Official Receiver, 22, Regent Street, Park Row, Nottingham.

M. Goldsmith (trading at Plymouth as the "Regent Radio Co."), "Revelarc," Newton Ferrers, Devon, wireless dealer.—First and final dividend of 2s. 9½d. in the £, payable August 27th at the Official Receiver's office, 11, St. Aubyn Street, Devonport.

L. A. Woodhead, 16, St. Paul's Road, Bradford, wireless dealer.—Discharged as from July 17th, 1934.

Company Liquidations

Barkers (Bedford), Ltd., wireless dealers, Midland Road, Bedford.—At the statutory meeting of creditors held recently at Bedford it was reported that the ranking liabilities were £451 and the total assets were £346. It was decided that the company should go into voluntary liquidation with Mr. C. S. Bryan, of Messrs. C. S. Bryan & Co., 17, St. Paul's Square, Bedford, as liquidator. The opinion was expressed that efforts should be made to obtain offers for the business as a going concern.

Ship Carbon Co. of Great Britain, Ltd.—Winding up voluntarily for the purpose of transferring the undertaking and assets to a new company of the same name. Liquidator, Mr. G. H. Robinson, Bassishaw House, Basinghall Street, London, E.C.2, appointed August 4th. Particulars of claims to be sent to the liquidator by October 31st. All creditors have been or will be paid in full.

United Ebonite Manufacturers, Ltd.—Winding up voluntarily for the purpose of selling the lands and buildings of the company to the Ship Carbon Co. of Great Britain, Ltd. Liquidator, Mr. G. H. Robinson, Bassishaw House, Basinghall Street, London, E.C.2, appointed August 4th. Particulars of claims to be sent to the liquidator by October 31st. All creditors have been or will be paid in full.

East Sussex Wiring Co., Ltd.—Winding up voluntarily. Liquidator, Mr. D. Robinson, County House, New Bridge Street, London, E.C.2.

Stenner & Gunn, Ltd.—Winding up voluntarily. Liquidators, Messrs. I. E. Goodland and S. Honey.

F. Hodgson & Co., Ltd.—Meeting at Balfour House, Finsbury Pavement, E.C.2, on August 31st to receive an account of the winding-up by the liquidator, Mr. W. A. J. Osborne.

T. S. Armstrong & Co., Ltd.—Meeting, August 23rd, at 53, Grey Street, Newcastle-on-Tyne, to receive an account of the winding-up by the liquidator, Mr. T. Bell.

W. D. Williams & Son, Ltd.—Particulars of claims to liquidator, Mr. W. Ll. Llewellyn (Messrs. W. H. Jones & Co.), 522, Royal Liver Building, Liverpool, by September 15th.

Workington Electric Power Co., Ltd.—Winding up voluntarily. Liquidator, Mr. H. Mossop, Ramsden Square, Barrow-in-Furness, appointed July 31st.

Rectifiers, Ltd.—Winding up voluntarily. Liquidator, Mr. G. R. Eaton, Allen House, Newarke Street, Leicester, appointed August 3rd.

Pasco (Liverpool), Ltd.—Winding up voluntarily. Liquidator, Mr. J. H. Hort, 202, Stanley Road, Bootle, appointed August 3rd.

Light Controlled Installations, Ltd.—Winding up voluntarily. Liquidator, Mr. G. C. Jarvis, 115-117, Cannon Street, London, E.C.4, appointed August 3rd. An agreement is to be entered into with a new company to be named "Alcon, Ltd., or such other name as may be available for registration."

Pettie & Co. (Electrical Engineers), Ltd.—A meeting of creditors was to be held yesterday (Thursday) at Nottingham.

Mead Electric Co., Ltd.—Meeting of creditors held on August 14th at Aldwych House, London, W.C.2.

Private Arrangements

Purvey & Varker, trading as "P. V. Electric," 21a, Teign Street, Teignmouth, electrical and radio engineers.—At a meeting of creditors at Teignmouth on August 8th it was reported that the liabilities were £300 and the net assets were valued at £331. The debtor Purvey started trading on his own account about two years ago with a capital of £50. After about twelve months he entered into partnership with Varker who brought in £285 in cash. Figures which had been prepared showed that during the eleven months to June last there was a net profit of £65, after allowing for the debtors' drawings of £2 per week each. The present position was attributed to lack of capital, certain losses, and costs of advertising. Neither of the debtors possessed any separate estate. Recently creditors had been pressing and executions had been levied. It was decided that Messrs. E. T. Collins & Son, 28, Baldwin Street, Bristol, should prepare an independent statement of affairs and that a deed of assignment should be executed in favour of Mr. A. Collins.

Reduction of Capital

Alfred Neale & Son, Ltd.—Reduction of capital from £5,000 to £2,500 confirmed July 27th.

Electricity Supply

Lighting, Domestic, Power

Batley.—LOAN.—The Town Council has received sanction to a loan of £10,000 for electricity purposes.

Bedlington (Northumberland).—STREET LIGHTING.—The Urban District Council has instructed the surveyor (Mr. J. W. Pooley) to estimate the cost of supplying electricity for street lighting throughout the urban area.

Bexley.—ANNUAL REPORT.—The borough electrical engineer, Mr. A. J. Abraham, states, in his annual report, that the amount of electricity purchased by the undertaking during the year ended March 31st, 1934, was 10,675,898 kWh, as compared with 7,990,667 kWh in 1933, an increase of 33.6 per cent. During the same period the load factor improved from 25.95 per cent. to 28.59.

Blackpool.—ILLUMINATIONS.—The town illuminations, which will run from September 15th to October 22nd, will be on a larger scale than before. Approximately 200,000 lamps will be employed and also gigantic new tableaux. The cost exceeds £13,000.

Darlington.—SUB-STATIONS.—Electricity sub-stations are to be erected by the Town Council in North Lodge Park, Brinkburn, and Stanhope Green, Darlington.

MAINS EXTENSIONS.—The Electricity Committee is to lay mains in Sun Street, Spring Court, Coniscliffe Road and Yarm Road.

France.—A 220,000-V LINE.—The Société pour l'Industries et l'Electricité, of Paris, has lately secured a concession for the establishment of a 220,000-V power transmission line between the Drac hydro-electric power station near Lyons and the Paris district. The line will have a maximum capacity of 100,000 kW.

ELECTRICAL PROGRESS.—The statistics on the production of electricity for 1933, just published, show an increase of over 1 milliard of kWh over 1932. This increase seems largely due to the increased use of electric lighting and of domestic appliances. In the vicinity of Paris, for example, the increase in industrial sections of the town is less than 3 per cent., while in residential districts it rises to as much as 15 per cent.

Gellygaer (Glam).—REDUCED CHARGES.—The Urban District Council has reduced the charges for electricity by ¼d. per kWh. An e.h.p. supply is to be given direct to the isolation hospital at an estimated cost of £324, for which sum a loan has been applied for.

Godstone.—SUPPLY AT BLETCHINGLEY.—The Rural District Council has consented to the County of London Electric Supply Co. providing a supply of electricity to council houses at Bletchingley under a prepayment hire-purchase scheme.

Guildford.—REDUCED CHARGES.—The Electricity Committee recommends that charges to consumers for power in the town area be reduced from 1½d. to 1⅛d. and from 1¼d. to 1⅛d. per kWh, and that the running charge for the all-in rate for the town area be reduced from ⅜d. to ¼d.

Hazel Grove and Bramhall.—NEW CABLE.—The Urban District Council has decided, owing to the low voltage in part of the supply area, to replace the cable on the western side of Chester Road with a 0.25 4-core cable at an estimated cost of £604.

India.—THE PYKARA SCHEME.—Some time ago the Madras Government decided to extend the electric power supply from Pykara to the Tanjore district. Our Bombay Correspondent now sends us further details of this scheme. It involves the construction of a 60-kV line from Trichinopoly to Negapatam *via* Tanjore and a branch line from Tanjore to Kumbhakonam, with sub-stations in the middle. The distribution in the East Tanjore district is being undertaken by an Electric Supply Corporation with its headquarters at Tiruvarur, where a power house is being constructed. The estimated cost of the scheme is Rs.21 lakhs, and the revenue anticipated for the first eight years is Rs.27 lakhs. A sum of Rs.4 lakhs will be spent in the current year to start the work, and for this a demand has been made by the Madras Government in the Legislative Council. Eventually the load of this extension will be transferred to the Mettur hydro-electric system, the estimates of which are now under the consideration of the Government.

SUPPLY IN BOMBAY SUBURBS.—The Bombay Suburban Electric Supply Co., Ltd., made good progress last year in its working. The number of new consumers connected to the mains during the year showed an increase of 11 per cent., whilst the company's total sales of current under all heads represented an improvement of 20 per cent. over last year. As regards lights and fans, sales were 15 per cent. greater, and in the case of motive power there was a substantial increase of 66 per cent. This is due to the growing activities of several factories. On the other hand, supply for domestic heating and power purposes shows a 2 per cent. increase only. In order to assist development of this branch, the company is opening a showroom.

Irish Free State.—DUBLIN.—New reduced rates for domestic consumers have been announced by the Electricity Supply

Board. Electricity for all domestic purposes, except hot-water supply, now costs ½d. per kWh for the first 360 kWh per two-monthly period, and ¼d. for all consumption in excess of 360 kWh. The special reduced rates for hot-water supply are ½d. per kWh for the first 360 kWh per two-monthly period and ¼d. for all in excess of 360 kWh. The Electricity Supply Board is building and equipping a house on the Mount Merrion Estate, near Dublin, for propaganda purposes, and it will be completed in a few weeks' time.

Kent.—X-RAY INSTALLATIONS.—The County Council is to engage a firm of consulting engineers in connection with a proposal to install X-ray apparatus at three institutions at an estimated cost of £4,000.

Leicester.—EXTENSIONS.—The Town Council has approved mains extensions at a cost of £12,866.

Lincoln.—LOANS.—A £30,000 loan is being sought by the electricity undertaking. £66,000 is left of the £100,000 February loan.

London.—GREENWICH.—The Borough Council has decided to have six miles of main road lighted by electricity.

Liverpool.—ELECTRICALLY EQUIPPED BATHS.—It is proposed to install twelve electric washing machines in the new slipper baths and public washhouses which the Corporation intends to build at a cost of £17,674 in Donaldson Street.

Lydde.—STREET LIGHTING.—The Town Council has adopted electricity for public lighting, and has accepted the tender of the Folkestone Electricity Supply Co., Ltd., for sixty-five lamps at £3 7s. each per annum.

Manchester.—DEVELOPMENT PROGRESS.—Figures are now available showing the progress of electrical development during April, May and June. During the three months, the new consumers numbered 1,685, 1,307 and 1,589 respectively; consumers' additional supplies totalled 825, 677, and 688, representing, altogether, 5,601, 4,012 and 4,837 kW. During May 213 orders were received for hired cookers, and 212 in June, bringing the total on circuit to 13,245. Corresponding figures for washboilers were 18, 19, and 665, and for water heaters 100, 115 and 382.

Manchoukuo.—ELECTRICITY SUPPLY.—A report from our Yokohama correspondent states that the five leading power companies in Japan have come to an arrangement whereby a power company will be formed by them, with a capital of 1,500,000 yen, for the purpose of supplying Manchoukuo. It is thought that Mr. K. Naito, vice-president of the Japan Power Co., will be chosen as president of the new company, as he has recently inspected personally the power resources and possibilities of development in Manchoukuo. He estimates the capacity of the twenty-seven rivers that could be harnessed at 1,500,000 kW.

Mansfield.—SUB-STATION.—The Electricity Committee is to proceed with the erection of a sub-station at Bath Lane, adjoining the L.M. & S. Railway bridge.

Much Wenlock.—OVERHEAD LINES.—The Council has decided, subject to minor alterations, to approve the scheme of the West Midland J.E.A. to provide a supply of electricity to Much Wenlock. The proposals include the construction of an 11,000 V line from Broseley to Much Wenlock with branches to several consumers on the way. The village will also be connected with the line near Shirlett.

New Zealand.—POWER INTERCONNECTION.—According to the *New Zealand Electrical Journal*, the erection of a 110,000-V transmission line from Arapuni to Stratford, connecting the three major hydro-electric systems in the north Island of New Zealand—Waikaremoana, Mangahao and Arapuni—has now been completed, and after it has been tested it will serve to ensure continuity of supply throughout the territory in the event of a breakdown of one of the systems. The line extends 123 miles through the King country to Taranaki. A telephone line runs parallel with the transmission line for its whole length.

Normanton.—HOSPITAL SUPPLY.—The Joint Hospital Committee has decided to take a supply of electricity from the Yorkshire Electric Power Co., Ltd., instead of having it generated on the premises. The cost of re-wiring, conversion, &c., will be between £300 and £400.

North Wales.—SUPPLY TO BALA.—The North Wales Power Company is making arrangements to supply Bala with electricity. The Bala Council has received intimation that the company is doing preliminary work now and hopes to have the scheme completed by the beginning of November.

Pengroescoped (Mon).—ELECTRIC LIGHTING.—A change from oil lamps to electric lighting has been made at the village of Pengroescoped, Llanover, Mon, which receives its supply from the South Wales Electric Power Co.

Persia.—POWER STATIONS.—The Asea Co., in conjunction with its associated concern, Messrs. Stal, of Finspong, has recently delivered a complete electrical equipment for the power station and electric drives of the new Shah-Abdoul Cement Works, Azim, Persia. For the power station a 900-kW Stal turbo-generator was supplied, and about thirty-five motors were delivered for driving the plant at the works. The Asea Co. has also recently completed the equipment of a power station at Ahwaz for the South Persian Railway authorities. The prime movers in this case consist of two Diesel engines having an output of 330 h.p. at 375 r.p.m. and direct connected to 300-kVA synchronous generators operating at 3,300 V, 50 cycles.

Ponders End.—STREET LIGHTING.—A long stretch of street lighting by means of electric discharge lamps is now in operation on the Hertford Road, near London, between Waltham Cross and Ponders End. This installation, which utilises the "Royal Ediswan Escura" lamp, was designed and planned by the North Metropolitan Electric Supply Co., in conjunction with the Edison Swan Electric Co., Ltd. A hundred and forty-five "Hertford" lanterns are employed, mounted on the tramway poles at a height of 24 ft., and arranged in a staggered formation with 100-130-ft. spacing between poles. The lighting system incorporates the new uni-directional form of illumination.

Poynton (Cheshire).—STREET LIGHTING.—The Cheshire County Council has granted an application by the Parish Council for consent to an expenditure of £700 for street lighting.

Rawtenstall.—STREET LIGHTING.—The borough electrical engineer, Mr. J. E. Shepherd, informs us that the whole of the street lighting in the borough is now electric, the last gas lamps having been converted this summer.

Reading.—BULK SUPPLY.—Negotiations are taking place with a view to the Town Council's giving a bulk supply of electricity to the Thames Valley Electric Supply Co., Ltd.

ELECTRICITY FOR BREWERY.—The borough electrical engineer has been authorised to negotiate with Messrs. H. & G. Simonds, Ltd., with regard to the supply of electricity to the company's brewery in Bridge Street.

Rotherham.—REVISED CHARGES.—The Town Council has revised the charges under the flat rate for lighting to 4d. per kWh for the first 1,000 kWh per quarter and in ½d. reductions, according to consumption, to a minimum of 1d. per kWh.

Russia.—NEW POWER STATION.—Preliminary work has been started on the Black Sea coast on the construction of a new hydro-electric power station on the Mzymta River. The plant will have a capacity of about 20,000 kW and will supply power to the health resorts of Socki, Matesta, Khosta and Adler.

Scarborough.—"ALL-IN" TARIFF DEFERRED.—The Town Council has again deferred, for the time being, its "all-in" tariff scheme for the electricity undertaking.

Shefford (Beds).—STREET LIGHTING.—Electric lighting is to replace gas in the village streets as a result of a recent decision of the Parish Council.

Spain.—ELECTRICITY OUTPUT.—The report of the Ebro Irrigation & Power Co., Ltd., for last year shows that the various hydro-electric undertakings controlled by the company in Northern Spain produced power to the extent of 635,492,066 kWh, as compared with 635,351,206 kWh in 1932. On the other hand, the output of the steam and internal-combustion-engined plants declined from 4,352,660 to only 167,820 kWh, while the amount of power purchased from other concerns fell from 130,202,628 to 122,894,160 kWh. The report mentions that constructional work on a new 45,600-h.p. hydro-electric station at Terradets is approaching completion.

Sudbury.—ELECTRIC STREET LIGHTING INAUGURATED.—On August 4th, Alderman G. F. Sidnell, the Deputy Mayor and chairman of the Electricity Committee, performed the ceremony of switching on the new electric street lighting which replaces the old gas system. The new installation comprises about 140 lamps and took only five weeks to carry out.

Sunderland.—SUB-STATIONS.—The Town Council is to erect sub-stations on the Fulwell Estate and in Silksworth Lane.

Sweden.—ELECTRIC POWER OUTPUT.—In its annual report to the Swedish Minister of Communications, says *Reuter's Trade Service* from Stockholm, Vattenfallsstyrelsen (the Waterfall Board), which controls the Government-owned hydro-electric power plants, states that the consumption of power in Sweden was not influenced much in 1933 by the trade depression. Particularly towards the end of the year, when prospects became brighter for many industries, including pulp, the consumption of power was about normal. The Government-owned plants, indeed, had some difficulty in producing the amount of power agreed upon with their subscribers, for in Central and South Sweden there was a serious drought towards the end of the year, the water level in several rivers being the lowest on record for 124 years. In 1933 the total consumption of power was 1,800,000,000 kWh, which is 205,000,000 kWh more than in 1932.

Taunton.—LOAN.—The Town Council is to apply for sanction to a loan of £1,000 for the purchase of static condensers, switchgear, and for installation work.

Torquay.—AUTOMATIC SUPERVISION.—The Electricity Committee is to install an automatic supervising system for the five principal sub-stations in the borough at an estimated cost of £1,700.

Wallsend-on-Tyne.—MAINS EXTENSIONS.—The Town Council has approved plans by the North-Eastern Electric Supply Co., Ltd., for the laying of low-voltage cables in McNamara Road, Edward Road and Savory Road, Wallsend.

Wareham.—OVERHEAD LINES.—The Bournemouth & Poole Electricity Supply Co. has notified the Rural District Council of its intention to erect overhead lines at Morden and Lytchett Matravers.

Wellington.—EXTENSIONS.—Wellington District Electricity Co., Ltd., is to carry out extensions in the outlying portion of the urban district on the south side of the town. The Urban District Council is not objecting to the use of overhead lines.

Whitehaven.—SUPPLY EXTENSION.—The Town Council has been informed by the South Cumberland Electricity Supply Co., Ltd., that it intends to apply for sanction to erect overhead lines for supplying Sandwith, under the Egremont and Cleator Moor Orders, 1924-31, and the Council has decided to approach the company on the matter, the Electricity Committee having expressed the opinion that it was desirable that the Corporation should become the authorised undertakers for the supply to the portions of the parishes of Preston Quarter and Sandwith added to the borough. An arrangement for the adjustment of the supply areas of the Corporation and the company is to be attempted.

Workington.—LOANS.—The Electricity Committee has obtained sanction to borrow £1,140 for the structural steelwork, floors and concrete foundations for the new showrooms, and £400 for switchgear, and is applying for sanction to borrow £7,250 for mains and services and £750 for ordinary meters.

Wooler (Northumberland).—ELECTRICITY FOR THE TOWN.—The North-Eastern Electric Supply Co., Ltd., Newcastle, is supplying electricity to Wooler. The necessary poles have been erected, and wiring is well advanced. Street lamps are expected to be ready in two months.

Worthing.—SUB-STATION.—The Electricity Committee is to erect and equip a sub-station at Mulberry Lane (£1,463).

Traction

Australia.—SYDNEY TRAMCARS.—Replying to a question in the N.S.W. Legislative Assembly, Mr. Bruxner, Deputy Premier, said that new tramcars for the Sydney system were being constructed at such a rate that 200 new vehicles would be running early next year. Mr. Bruxner said that probably not many more tramcars would be built, the tendency being to run trolley-buses because they were easier to handle than tramcars.

Burnley.—TRAMS TO GO.—The question of substituting buses for trams on the main Padiham-Nelson route is being considered by the Burnley, Colne and Nelson Joint Transport Committee, which also proposes, at an early date, to change over to buses on the Manchester Road and Towneley routes.

France.—THE PARIS-LE MANS LINE.—The capital cost of electrifying the Paris-Le Mans line of the French State Railways and several suburban lines of the East Railway is estimated to be 820,000,000 francs. The conversion work is to be spread over four years, and will give employment to 16,000 workers for an average of thirty months. The purely electrical industry will benefit by orders to the value of 270,000,000 francs, the copper industry by 126,000,000 fr., and the various other branches of the metal industry by 220,000,000 fr. It is calculated that the direct advantages of electrification will result in a return of 6½ to 7 per cent. on the invested capital.

India.—RAILWAY ELECTRIFICATION.—In our issue of July 6th we published a note from our Bombay Correspondent stating that the extension of the electrification of the G.I.P. Railway as far as Nagpur was under consideration. Mr. L. Turner, M.I.E.E., Power House Superintendent, Kalyan, writes to inform us that "such a proposal is not known to the officers in charge of the electrification of the G.I.P. Railway."

Portsmouth.—TROLLEY-BUSES IN OPERATION.—The first eleven of Portsmouth's new trolley-buses have been put into service. The whole of the Corporation tramway system is to be superseded by either trolley-buses or petrol buses within the next two years.

Reading.—TROLLEY-BUSES.—The Town Council is to apply for a Provisional Order authorising it to operate trolley-buses in Thames Side Promenade (from the present tramway terminus), Caversham Road, Friar Street, West Street, St. Mary's Butts, Bridge Street, Southampton Street, Whitley Street, and Christchurch Road.

Russia.—RAILWAY ELECTRIFICATION.—Work has lately been commenced on the electrification of the Kandalaksha-Apatite Khibin section of the Murmansk Railway, a distance of about 72 miles. It is intended later to electrify the section between Murmansk and Apatite, a distance of nearly 120 miles.

Southern Railway.—SUGGESTED ELECTRIFICATION EXTENSION.—The Littlehampton Urban District Council has requested the Southern Railway Company to extend the electrified line from Worthing to Littlehampton. A halt at Lyminster has also been asked for. The company has not as yet made a decision in the matter.

Switzerland.—ELECTRIC TRACTION PROGRESS.—According to the *Bulletin* of the Société du Banque Suisse, about fifty additional miles of the Swiss Federal Railway system were electrified during last year, raising the length of the electrified lines from 1,137 miles at the end of 1932 to 1,187 miles, or approximately 65.1 per cent. of the total Federal Railway system. Further electrification work is proceeding, and it is anticipated that by the end of the present year the electrically operated lines will have an aggregate length of 1,286 miles. At the end of the past year the Federal Railway authorities possessed 491 electric locomotives, 21 electric tractors, and 48 electric rail motor coaches.

Traffic Signals.—The Worcestershire County Council has approved a scheme by Stourbridge Borough Council for the installation of automatic traffic signals at the Town Clock junction, at a cost of £580, subject to the approval and grant of the Ministry of Transport.

The erection of automatic traffic signals at Market Gate and Bridge Foot is being considered by Warrington Watch Committee.

High Wycombe Town Council is to erect automatic traffic signals at the junction of Crendon Street with High Street.

United States.—FAST ELECTRIC TRAINS.—Exceptionally fast services are now being worked by multiple-unit electric trains on the Chicago, North Shore and Milwaukee Railway. The normal trains run at hourly intervals throughout the day, and average 50 m.p.h., including eight stops, over the 77 miles from Milwaukee to Chicago. Two start-to-stop bookings of 60 m.p.h. and one at 63 m.p.h. over a distance of 21 miles are incorporated in the above schedule, but are far outstripped by the Chicago Special, which leaves Milwaukee at 8 p.m. and averages 59 m.p.h., including five stops. From a Milwaukee suburban station the 74 miles into Chicago are covered in 68 minutes, inclusive of three intermediate stops, and even allowing stops of only 15 seconds duration, the successive start-to-stop speeds between the intermediate stations are 64¼, 75, 70¾, and 62 m.p.h., which give what is claimed to be by far the fastest service of its kind in the world.

Weston-super-Mare.—TRAMS TO CONTINUE.—The Urban District Council has decided to take no action with regard to a proposal by the Weston-super-Mare & District Electric Supply Co., Ltd., to substitute trolley-buses for the trams. At present the tramway system is operated by the Electric Supply Co., Ltd., under a lease which still has about six years to run. The Council states that it is willing to consider further suggestions such as the disposal of the trams at scrap-iron prices.

Communications

Australia.—AUTOMATIC TELEPHONE EXCHANGES.—Mr. H. P. Brown, director of Posts and Telegraphs, states that this year thirty automatic telephone exchanges will be established in country towns throughout the Commonwealth.

Channel Islands.—RADIO-TELEPHONE SERVICE.—If experiments now being undertaken are successful the Post Office proposes to link up the islands with the mainland by means of a radio-telephone service operating between Guernsey and a station in Dorset. A wavelength of between five and seven metres will be used, and it is hoped to have the service inaugurated before the end of the year.

France.—ANTI-INTERFERENCE STANDARDS.—The French Union des Syndicats de l'Electricité has recently issued draft standard regulations in respect of (1) anti-interference devices and systems to overcome radio interference, and (2) for the supply of wooden poles for the support of overhead power transmission lines.

Great Britain.—RADIO LICENCES.—At the end of July the number of licences in force was 6,395,560, an increase of 770,660 during the past year. During July, 239,580 wireless licences were issued, a net increase of 21,970.

Scotland.—NEW GLASGOW-LIVERPOOL CABLE.—A new trunk telephone cable is being laid from Glasgow to Liverpool. Engineers of the Glasgow Post Office Telephone Department, under the direction of Mr. Harvey Smith, superintending engineer, are engaged in laying the cable from the city as far south as Carlisle, a distance of 100 miles, of which twenty-three miles have already been laid. A start was made at the end of June at Beattock, where it is intended to erect a repeater or amplifying station. The cable will be taken from Glasgow by way of Bothwell, Hamilton, Larkhall, Beattock, and Dumfries to the Borders, and the work is expected to be completed by the beginning of November. The cable consists of 211 circuits between Glasgow and Liverpool. On the section between Glasgow and Hamilton it will contain an additional ninety circuits, and four of the 211 circuits have been specially designed for use by the B.B.C. They are made of heavier gauge wire than usual, and have been screened to avoid interference. They will be used for making simultaneous broadcasts, which at present are made by the ordinary telephone trunk circuits.

The McMichael "Suitcase" portable receiver shown at the Radio Exhibition **(See page 214)**

Contract Information

When "Contracts Open" are advertised in our "Official Notice" pages the date of the "Electrical Review" containing the advertisement is given in parentheses below

Contracts Open

Australia.—MELBOURNE.—Posts and Telegraphs Department. September 4th. Telephone tags, connection plates, strips and terminals. (A.Y. 12497.)* Vitreous resistances. (A.Y. 12473.)* Telephone switchboard plugs and sleeves. (A.Y. 12472.)*
September 11th. Telephone instrument cords. (A.Y. 12505.)* Condensers of various capacities. (A.Y. 12500.)*
September 18th. Telephone receivers together with spare ear pieces, &c. (A.Y. 12501.)* Telephone switchboard cords. (A.Y. 12536.)*
September 25th. Telephone transmitters and parts. (A.Y. 12544.)*
October 17th. Victorian Railways. Selector telephone equipment consisting of a control office with thirteen radiating lines. (A.Y. 12532.)*
TOWNSVILLE.—October 11th. One 1,000-kW self-contained turbo-alternating unit complete with exciter auxiliary plant and all necessary instruments and fittings. (A.Y. 12535.)*

Azores.—PONTA DELGADA.—November 5th. Municipal Council. Hydro-electric plant comprising Francis turbine, 3-phase alternator, oil-cooled transformer, switchgear, &c. (A.Y. 12504.)*

Barnes.—September 12th. Corporation. Traffic control signals. (August 10th.)

Beckenham.—August 27. U.D.C. L.p. cable requirements until December 31st, 1934. (July 27th.)

Bournemouth.—August 25th. Corporation. Thirty-six six-wheeled, double-deck trolley omnibuses. Specifications from Engineer, Transport Offices, Wootton Gardens (deposit £2 2s.).

Brighton.—September 10th. Corporation. One 30,000-kW turbo-alternator with condensing plant and auxiliaries, and one 150,000-lb. steam-raising unit. (August 10th.)

Bristol.—September 7th. Electricity Department. Four 130,000-lb. steam raising units. (August 3rd.)

Burnley.—August 17th. Town Council. Vehicle-actuated traffic signals. Borough engineer.

Colwyn Bay.—August 23rd. Electricity Department. Internal colour-sprayed lamps, holders, t.r.s. cable and an illuminated sign. (See this issue.)

Croydon.—September 5th. Town Council. Six months' supplies of stores, including electrical fittings and appliances, for Queen's Road Homes and other institutions. Town Clerk, Public Assistance Offices, Mayday Road, Thornton Heath.

Dalkeith.—September 1st. Town Council. Various works, including electrical, for 148 flatted houses. Specifications, &c., from Morham & Brotchie, surveyors, 29, Hanover Street, Edinburgh; tenders to J. C. Sturrock, Town Clerk.

East Africa.—MOZAMBIQUE.—October 15th. Port and Railway Administration. Gas producer, motor, alternator, and distribution board. (G.Y. 14075.)*

East Dereham.—September 3rd. Electricity Department. Cable, e.h.p. sub-station switchgear, transformers, kiosks and switchgear, and l.p. overhead distributor lines. (See this issue.)

Egypt.—October 18th. Egyptian Government. Three complete electric pumping stations, with machinery and accessories at Fua, Balamoan and Serw. Chief Inspecting Engineer, Egyptian Government, 41, Tothill Street, S.W.1. (non-returnable deposit £3 1s. 6d.).

CAIRO.—October 18th. Ministry of Public Works. Evacuating and unwatering pumps with electric motors, switchgear, main electric motors, accessories, switchgear and accessories, main and auxiliary transformers and accessories, oil for transformers and circuit-breakers, station electric lighting and equipment, and filter plant and accessories. (G.Y. 14151.)*

Hillingdon.—August 30th. Middlesex C.C. Public Assistance Department. X-ray equipment at County Hospital. (See this issue.)

Hoylake.—August 31st. Urban District Council. Electrically driven centrifugal borehole pump. Water Engineer, Town Hall.

India.—CALCUTTA.—September 3rd. East Indian Railway. One laminated spring press complete with motor and starting gears, one multiple spindle drilling machine and one press for punching m.s. plate. (A.Y. 12549.)*
SIMLA.—September 11th. Stores Department. Power station plant for Saidpore Power House. (A.Y. 12519.)*

Leeds.—September 15th. City Council. Boiler house equipment for Kirkstall power station extension. Particulars from Mr. C. Nelson Hefford, 1, Whitehall Road, Leeds (deposit £5). (See this issue.)

London.—FULHAM.—September 4th. Borough Council. Rewiring and modernising of the electrical installation in the old portion of the Town Hall. (August 10th.)

Maidens and Coombe.—August 20th. U.D.C. Electric street lighting. (See this issue.)

Manchester.—August 27th. Electricity Committee. Twelve months' requirements of welded steel lamp columns and fittings. Specification (No. 439) from Mr. H. C. Lamb, Electricity Department, Town Hall.

New Zealand.—Dunedin Corporation. September 12th. Three 150-kVA and three 100-kVA, three-phase, oil-cooled, outdoor transformers. (A.Y. 12523.)* Voltage regulators for use on a 6,600-V 3-phase circuit. (A.Y. 12524.)*
WELLINGTON.—September 11th. Post and Telegraph Department. Forty miles of insulated and braided bronze wire in 440-yd. lengths. (A.Y. 12526.)*
September 12th. Forty miles of flameproof jumper wire (2-12½). (A.Y. 12528.)* 100 miles of 1/0.044 in. and 30 miles of 1/0.036 in. v.i.r. twisted pair, tinned copper wire. (A.Y. 12529.)*
September 13th. Paper-insulated lead-covered cables and armoured telephone cables. (A.Y. 12527.)*
October 10th. Telephone cable (A.Y. 12554)* (A.Y.12555.)*
October 17th. 5,000 four-conductor and 500 six-conductor telephone instrument cords. (A.Y. 12553.)*

Northern Ireland.—BELFAST.—August 22nd. Tramways Committee. Cadmium copper trolley wire. Form of tender, specification and particulars from the General Manager, Tramways Department, Sandy Row; tenders to Town Clerk.

Ormskirk.—August 17th. Urban District Council. Electric lighting installation at Isolation Hospital. U.D.C. Surveyor, Council Offices (deposit £1 1s.).

Oswestry.—August 31st. Electricity Department. Transformer, switchgear, cables and overhead distribution in connection with the Morda rural extension and transformer and h. and l.p. switchgear in connection with the Cross Market sub-station extension. (See this issue.)

Plymouth.—August 25th. City Council. Supply of electricians' sundries, lamps and cables. Tenders to the Town Clerk, Municipal Buildings, Plymouth.

Plympton St. Mary.—September 1st. Rural District Council. Supply and erection of h.v. switchgear, pole transformers, 6,300-V overhead lines, medium- and low-voltage overhead and underground distribution mains, &c., in connection with the extension of Tamerton and Roborough. Details from the electrical engineer, Council Offices, Plympton.

St. Helens.—September 4th. Electricity Department. H. and l.p. p.i. cables. (See this issue.)
August 30th. Transport Department. Eleven double-deck top covered four-wheel type trolley buses. Specifications and particulars from General Manager and Engineer, Corporation Transport, Hall Street; tenders to Town Clerk, Town Hall.

Salford.—August 29th. City Council. Twelve oil circuit-breakers and one lead-acid battery. (See this issue.)

Sheffield.—September 18th. Electricity Department. Cooling towers and civil and constructional engineering work at Blackburn Meadows generating station, and civil and constructional engineering work at Neepsend power station. (August 3rd.)

South Africa.—PORT ELIZABETH.—September 17th. South African Railways and Harbours. Pumping equipment for Port Elizabeth Harbour. (G.Y. 14113.)*

Southend-on-Sea.—September 3rd. Electricity Department. Supply for a period of two years of h.p. and l.p. underground cables. (July 27th.)

Sunderland.—September 3rd. Electricity Department. Paper-insulated cable, rubber-insulated wire, meters and lamps. (August 3rd.)

Teddington.—August 30th. Commissioners of H.M. Works. Laying ducts and cables at the National Physical Laboratory. (See this issue.)

Wallasey.—August 20th. Corporation. Supply and laying of e.h.p. cables. Specifications from Borough Electrical Engineer, Seaview Road.

Wigtown.—September 10th. County Council. Various works, including electric tubing, at seventy-four houses. Specifications from R. G. Logan, county architect, Stranraer (deposit £1); tenders to County Clerk, County Buildings, Stranraer.

Willenhall.—September 3rd. U.D.C. Electric wiring of seventy-four houses at Bilston Lane. Plans, specifications, &c., from G. A. Waite, Town Hall (deposit £2 2s.); tenders to F. G. T. Webb, clerk, Town Hall.

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* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

Contracts Closed

Cheshire.—County Roads Committee. Accepted. Traffic signals at Nantwich (£351) and Knutsford (£409).—Automatic Electric Co., Ltd.

Darlington.—Town Council. Accepted. Cables.—Callender's Cable and Construction Co., Ltd.

Dover.—Town Council. Accepted. Alterations in connection with the change-over.—English Electric Co., Ltd.; A. Reyrolle & Co., Ltd.; Switchgear & Cowans, Ltd.; Crompton Parkinson, Ltd.; Collins Electrical, Ltd.

Epsom.—Electricity Department. Accepted. Two-part tariff prepayment meters for one year.—Venner Time Switches, Ltd.

Kidderminster.—General Purposes Committee. Recommended. Renewing wiring at municipal buildings (£140).—S. J. Beard.

Newcastle-on-Tyne.—City Council. Accepted. One 900-kVA transformer (£381).—C. A. Parsons & Co., Ltd.

South Africa.—CAPE TOWN.—Electricity Committee. Accepted. Switchboard (£1,378).—A. Reyrolle & Co., Ltd. Cables.—Dowson, Dobson & Behr, Ltd. (£1,240); Hubert Davies & Co., Ltd. (£827); British Insulated Cables, Ltd. (£2,549); Wilson & Herd, Ltd. (£5,166); Trevor Williams, Ltd. (£602); Standard Telephones & Cables, Ltd. (£632); British General Electric Co., Ltd. (£105).

Tunbridge Wells.—Electricity Committee. Recommended. Cables for supply to Tonbridge.—Standard Telephones & Cables, Ltd.

Watford.—Highways Committee. Recommended. Traffic signals at Aldenham Road (£432).—Automatic Electric Co., Ltd.

West Hartlepool.—Town Council. Accepted. Traffic signals.—J. H. Holmes & Co., Ltd.

Notes

A Speakers' Lecture Course for Women

The Electrical Association for Women, which has its headquarters at 20, Regent Street, London, S.W.1, has organised a Speakers' Lecture Course to be held at King's College of Household and Social Science, Campden Hill Road, London, W.8, from September 26th to 28th. Following a welcome by the president, Margaret Lady Moir, O.B.E., at 10 o'clock on Wednesday morning, the 26th, there will be an address on "The History and Geography of the Progress of Electricity," by Miss C. Haslett, C.B.E., Comp. I.E.E., and a lecture "The Art of Public Speaking," by Miss L. Bell. The afternoon session is at the E.A.W. headquarters and will be devoted to three simple lectures on electrical matters by Miss M. M. Partridge, B.Sc., A.M.I.E.E. On Thursday morning a typical lecture on "Electricity in the Home" will be given by Miss D. Vaughan, and Miss Bell is to take a practice speaking class. The afternoon session will be at the E.L.M.A. Lighting Service Bureau and will comprise an address "Modern Views on Lighting" by Mr. W. J. Jones, M.Sc. (Eng), M.I.E.E., inspection of the demonstration rooms, and a lecture on "Points for Speakers on Electric Lighting," by Miss D. M. Noakes. On Friday morning Mrs. E. Elmitt Edwards will discuss "Lecture Subjects for Various Women's Organisations." An interesting programme of social events has also been arranged.

Farm Electrification Research

The New York State College of Agriculture at Cornell University is carrying out extensive research work in rural electrification in co-operation with leading utilities and electrical manufacturers. The projects undertaken, says the *Electrical World*, include the response of the codling moth to light, a study of electric soil sterilisers, the place of electricity in the farm, cooling and handling of eggs, milk house construction and equipment, and electric brooding. Manufacturers have lent equipment. The College is also lending equipment and the services of its personnel, and utilities are contributing $6,000 towards the cost of the work.

The Institute of Marine Engineers

Mr. J. N. Silley, O.B.E., the president of this Institute, is to deliver his address on September 11th at the Institute premises, Minories, London, E.C.3. The chair will be taken by Mr. J. Hamilton Gibson, O.B.E., chairman of the Council.

Fatality

Harry Bradbury, aged thirty-five years, a member of the Wilmslow, Cheshire, voluntary fire brigade, was killed by electric shock during a fire at a private house on August 13th. A verandah, which Bradbury seems to have mounted with a water hose in one hand, gave way and to save himself deceased clutch an electric cable. According to *The Times* artificial respiration was tried for an hour and special resuscitation apparatus was also employed, but in vain.

New Australian Wiring Rules

A revised edition of the electrical wiring rules has been prepared by the Standards Association of Australia following a conference of the various interests. The rules are divided into two parts—one covering wiring methods and the other dealing with materials, appliances, fittings, and apparatus. A separate set of rules for radio apparatus is to be issued under the title "The Standards Association of Australia Radio Code."

The E.P.E.A. Dinner

The annual dinner of the Electrical Power Engineers' Association (Southern Division) will be held on October 6th at the King's Hall, Holborn Restaurant, W.C., when the principal guest will be Alderman Huntsman, of Nottingham.

Electricity on Steel Ships

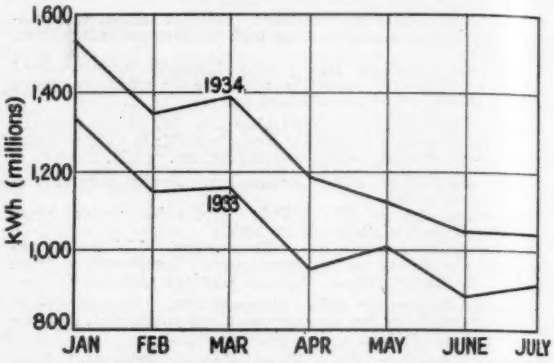
Important additions have recently been made to the "Rules for the Construction and Classification of Steel Ships," which are issued by Lloyd's Register of Shipping. Several sections of the Rules for Electric Fittings (now termed "Equipment") have been amended and new tables added, while new "Rules for Electric Propelling Machinery" have been inserted. These deal with the construction and inspection of electrically-driven vessels; the arrangement of steam and oil prime movers; and the general requirements of the electric propulsion machinery. Separate sections are devoted to a.c. and d.c. systems, and a long section specifies the general requirements for propulsion control gear and switchboards. Conductors and cables are dealt with next, followed by secondary batteries, and then works tests and trials of machinery. The last section concerns spare gear to be carried for electrical equipment and its storage. There are several tables of dimensions of wires and cables, as well as four appendices on bus-bars and connections; motors and generators for auxiliary purposes; alternators, motors, and d.c. generators for electric propulsion purposes; and generators and motors, including exciters, balancers, boosters, and the motors for driving them, in conjunction with propelling machinery.

A new edition of the Society's publication embodying the "Rules for Electric Propelling Machinery" is in course of preparation and will shortly be obtainable at 5s. per copy from Lloyd's Register of Shipping, 71, Fenchurch Street, London, E.C.3.

The Generation of Electricity

The official returns rendered to the Electricity Commissioners show that 1,042 million kWh of electricity was generated by authorised undertakers in Great Britain during the month of July, 1934, as compared with the revised figure of 913 million kWh in the corresponding month of 1933, representing an increase of 129 million kWh or 14.1 per cent. The number of working days in the month (*i.e.*, excluding Sundays) was twenty-six, the same as last year.

During the first seven months of 1934, up to the end of July, 8,672 million kWh was generated, as compared with the revised figure of 7,408 million kWh for the corresponding period of 1933, representing an increase of 1,264 million kWh or over 17 per cent. The comparative outputs month by month in 1933 and 1934 are shown in the accompanying curves, which also demonstrate the very large fall in the summer period.



Electricity generated in each month of 1934 compared with 1933

The Design of the I.M.E.A.

Mr. J. B. Tucker, the managing director of Messrs. J. H. Tucker & Co., Ltd., informs us that during an idle holiday moment he happened to notice the design of the seal or crest of the I.M.E.A. and he is now wondering whether anybody can explain the significance of the extraordinary design incorporated as its main feature. There appears to be, he says, a very militant-looking Boadicea riding on a chariot which looks like the lower half of Stephenson's "Rocket." Whether the flashes of lightning are supposed to be driving the vehicle or whether the vehicle is supposed to be ploughing its way through this lightning is open to question; at any rate, this vehicle of sorts seems to be balancing itself in a most marvellous way upon a single axle, and the lady driver must be highly complimented upon the way in which she manages to keep the vehicle upon an even keel.

Perhaps some of our heraldically minded readers can solve this rather nice problem.

Dangerous Hairdressing Installations

The Belfast Electricity Department is taking steps to remedy a situation which is likely to lead to trouble. We refer to the use of unearthed metal-covered switches and apparatus in hairdressing establishments. In a circular letter addressed to the proprietors of such establishments it is pointed out that a shock received by a client due to faulty electrical equipment, such as hair clippers, permanent wavers or hair driers, used with the installations referred to would probably prove fatal. This danger can be removed if plugs and sockets for use with portable appliances are of the three-pin pattern wired in accordance with the Department's regulations and if three-core flexibles are used with all apparatus having exposed metal which is liable to become alive should a fault develop. It is further stated that unless an electrical installation is in accordance with the Department's safety regulations, the supply will be disconnected. The Department offers to give any further information which may be required.

Appointments Vacant

Lecturer on electric lift construction, erection and maintenance (evenings) for the Borough Polytechnic.

Switchboard supervisor Portobello power station (£250) for Edinburgh Corporation Electricity Department.

Female showroom attendant and demonstrator for Spalding U.D.C. Electricity Department (salary £130-£156 per annum).

Mains foreman and assistant for the Stepney Borough Council Electricity Department (salary £6 5s. per week).

Shift charge engineer for the Croydon Electricity Department.

Deputy station superintendent at the Pigeon House Station, Dublin, of the Irish Free State Electricity Supply Board (salary £450, rising to £650).

(See our classified advertisements.)

Makers' Names Wanted

DREADNOUGHT factory type switch.

A two-pin socket and plug incorporating a neon indicator and the necessary connections.

Our Personal Column

Electrical men are invited to keep readers of the "Electrical Review" posted concerning their movements

Dr. C. V. Drysdale, whose retirement from the Civil Service is announced, was born in 1874. He received his technical training at the Finsbury Technical College and the Central Technical College. He was awarded the Siemens Memorial Medal in 1892 and gained diplomas in physics and electrical, mechanical and civil engineering. His D.Sc. degree was conferred upon him in 1901 for a thesis on "The Behaviour of Iron and Steel in Rotating Magnetic Fields." From 1893 to 1896 he acted as confidential scientific assistant to Messrs. Nalder Bros. & Co. and he then became associate head of the Electrical Engineering and Applied Physics Department of the Northampton Institute. In 1900 he was appointed head of the Optical Section, and in this field of science he acted as vice-chairman of the jury on optical instruments at the 1904 St. Louis Exhibition. He became president of the Optical Society in the same year. Since 1902 he has been an examiner in optics to the Spectacle Makers' Company, of which he is a liveryman. From 1910 to 1916 he was engaged privately in the study of economics and sociology, and he then became a partner in the firm of H. Tinsley & Co. He joined the Admiralty in 1918 as chief of research at the Parkstone Quay experimental station, later becoming scientific director at the Shandon experimental station and superintendent of the Admiralty Research Laboratory, Teddington. He was appointed Director of the Department of Scientific Research and Experiment at the Admiralty in 1929. His services have received official recognition by the award of the O.B.E. and the C.B. (Civil Division). He is a member of the Institution of Electrical Engineers. Dr. Drysdale has written very extensively upon electrical and optical subjects for the technical Press and scientific bodies, and he is the author of "The Foundations of Alternate-current Theory" and "Electrical Measuring Instruments." He has also been responsible for many inventions, including the first accurate single-phase and polyphase wattmeters. We hope that he will enjoy many more years of health, and we feel sure that they will not be inactive years.

[Elliott & Fry

Dr. C. V. Drysdale, C.B., O.B.E.

Mr. C. S. Wright, O.B.E., M.C., M.A., has been appointed to succeed Dr. Drysdale as Director of Scientific Research at the Admiralty.

Mr. T. Kearns, of the Mains Department of the Blackpool Corporation electricity undertaking, was recently presented with a gold wristlet watch by Mr. Charles Furness, the borough electrical engineer, on behalf of the staff, on the occasion of his leaving to take up a position with the Manchester Corporation Electricity Department.

Mr. A. Withers receiving his armchair from Mr. S. H. Mander

Mr. A. Withers, as noted in our last issue, was recently presented with an armchair by employés of Messrs. F. & C. Osler, Ltd., Birmingham, on his retirement after sixty-one years' service. We are now able to reproduce, by courtesy of the *Birmingham Gazette*, a photograph of Mr. S. H. Mander making the presentation. The occasion was a very unusual one, for few men can have had such a lengthy record of service with one concern.

Mr. C. A. Hazeltine, who has joined the board of Messrs. G. P. Cosway, Ltd., Nuneaton, served his early years with the Stepney Borough Council as a civil engineer, and in 1915 joined the staff of the Metropolitan-Vickers Electrical Co., Ltd., Trafford Park, Manchester, serving for fourteen years as sales manager of that company's Control Gear Department. He left the Metro.-Vick. Co. in 1928 to take up an appointment at the Bradford Works of the English Electric Co., Ltd., as sales manager of the company's motor and control gear business, which position he has just vacated.

[Lafayette

Mr. C. A. Hazeltine

Mrs. F. V. L. Matthias, wife of the borough electrical engineer of Warrington, has been invited by the Corporation Electricity Department to assist in the formation of a Warrington branch of the Electrical Association for Women.

Mr. J. Whiteford Milligan, B.Sc., A.M.I.E.E., of Stafford, was married on July 30th, at St. Andrew's Church, Preston, near Dumfries, to Miss Lilian Blackburn.

Mr. W. J. Cleary has been appointed chairman of the Australian Broadcasting Commission in succession to Mr. C. Lloyd Jones, who has resigned owing to pressure of business as head of David Jones, Ltd., a Sydney departmental store. Mr. Cleary was appointed Chief Commissioner for Railways in New South Wales in 1929, but later he resigned that position. The chairmanship of the Broadcasting Commission is a part-time appointment, and is for three years, at a salary of £500 a year.

Mr. A. C. Baker, A.M.I.E.E., general manager of Simpson, Baker & Co., Ltd., electrical and radio wholesalers, Bristol, since the company's formation, has been appointed managing director.

Mr. G. V. Desborough, late of the Harland Engineering Co., Ltd., has joined the Manchester office staff of Messrs. Johnson & Phillips, Ltd., as sales engineer.

Mr. T. Healey, electrical engineer at Bombay for Callender's Cable & Construction Co., Ltd., who is home on leave, was married, on August 1st, at St. Peter's Catholic Church, Doncaster, to Miss Gladys Paulger. Following the reception, Mr. and Mrs. Healey left for the honeymoon at Torquay. They are to go to India in the New Year.

Mr. A. M. Baroni, managing director of Messrs. Marelli & Co., Ltd., and one of the founders of the company, has resigned from the position of managing director and director owing to indifferent health. Mr. Baroni has been actively associated with the Italian Chamber of Commerce in London

Mr. A. M. Baroni **Mr. C. M. Baroni**

for many years. He joined the Council in 1912, and was president in 1925-27. In 1932 he was unanimously appointed an honorary vice-president. **Mr. C. M. Baroni,** who has also been connected with the company since its inception, has been appointed to succeed Mr. A. M. Baroni as managing director.

The Guildford Corporation Electricity Committee recommended to the Council at its last meeting that an agreement should be entered into with **Mr. A. E. Affleck,** the borough electrical engineer, for the retention of his services for three years from August 1st, 1934. According to the *Surrey Advertiser*, the agreement was to contain a provision for his release in the event of his obtaining an appointment with the Electricity Commission, the Central Electricity Board, or other national appointment. The recommendation was taken back for further consideration.

Mons. P. Langevin, president of the Société Française des Electriciens, has been elected a member of the Physics Section of the French Académie des Sciences in succession to the late Mons. P. Villard.

Mr. F. W. Smith has resigned from the position of manager of the Marine Department and specialist representative with Messrs. Crompton, Parkinson, Ltd. Mr. Smith, who is vice-chairman of the Association of Supervising Electrical Engineers, was formerly with Laurence, Scott & Electromotors, Ltd., for a period of twenty-five years, holding the position of assistant to the general sales manager.

Mr. F. W. Smith

M. Ernesto Mercier, the president of the Société de Constructions Mécaniques et Electriques Alsthom, has lately been elected president of the International Conference of Large Electricity Distribution Undertakings in succession to M. Ulrich, whose death was recently reported.

Mr. J. F. Simpson, who is retiring from the position of borough electrical engineer at Preston, received parting gifts from the staff and employés of the electricity undertaking on August 9th. The presentation, which took the form of a roll-top desk and typewriter, was handed over by Mr. J. See, the employé with the longest record of service under Mr. Simpson. Mr. D. Adams, deputy engineer, who has succeeded Mr. Simpson, presided.

Mr. T. Handley has been appointed London sales manager for Ensign Lamps, Ltd. The London office of the company is at Broadway Chambers, Ludgate Hill, London, E.C.4.

Mr. Harold Wood, of the Dewsbury Corporation Electricity Department staff, who was married on August 4th to Miss Ida Alcock, has been presented by his colleagues with a timepiece.

Obituary

Mr. T. W. Douglas.—Mr. Thomas W. Douglas, of Cork, a retired superintendent of telegraphs, died suddenly last week. He was watching a lawn tennis tournament at Cork when he collapsed, and died almost immediately. Mr. Douglas served for about forty years in the Telegraph Department of the G.P.O., attaining the position of superintendent at Cork, from which he retired a few years ago.

Mr. H. G. Sugden.—The death is reported, at the age of eighty-two years, of Mr. Hatton Greenwood Sugden, of Bramber, who was a director of the original Steyning Electric Light Co., Ltd.

Mr. F. Bachelor.—On July 17th there died, in his sixty-seventh year, in America, Mr. Frank Bachelor, a mechanical engineer who was born in England and went to the States in his youth. There he worked in association with his uncle, Charles Bachelor, who, according to the *Electrical World*, was a partner of Edison in the ownership of the incandescent lamp patents. For some time Mr. F. Bachelor worked under his uncle and Edison at the New Jersey iron ore concentrating works.

Mr. T. A. Smith.—The death is announced at Walsall, at the age of seventy-seven, of Mr. T. A. Smith, chairman of the Electrolytic Plating Apparatus Co., Ltd., of Birmingham.

Mr. J. R. Cooke.—The death occurred last week, as the result of a motor accident, of Mr. John Robert Cooke, who was chairman of the Hydro-Electric Power Commission of Ontario until the recent elections, when he resigned from that position.

Wills.—**Mr. J. J. Fahie,** M.I.E.E., left £16,615 (net personalty £16,553). He bequeathed all his property to Mr. R. Rankin, M.P. for the Kirkdale Division of Liverpool.

The late **Mr. A. Ogle,** who was formerly secretary of the Marconi group of companies and deputy manager of Marconi's Wireless Telegraph Co., Ltd., left £8,801 (£7,003 net personalty).

Financial Section

New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies, Dividend Changes, Transactions in Stocks and Shares

New Companies Registered

Anthony Tanous, Ltd.—Private company. Registered August 9th. Capital, £5,000 in 4,000 6 per cent. cumulative preference shares of £1 and 20,000 ordinary shares of 1s. each. Objects: To acquire the business of an electrical contractor, engineer, lighting specialist and dealer in electrical fittings and accessories now carried on by Anthony Tanous at 140, Fulham Road, S.W., as "Anthony Tanous." The first directors are: A. Tanous (permanent director and chairman), 139, New King's Road, Fulham, S.W.6; and T. J. G. Tengwall, 203, Castelnau, Barnes, S.W.13. Solicitors: Grant, Davies and Co., 6, Norfolk Street, W.C.2.

Beaver Electrical Supply Co., Ltd.—Private company. Registered August 10th. Capital, £10,000 in £1 shares. Objects: To carry on the business of electricians, electrical and mechanical engineers, manufacturers and factors of and dealers in electric lamps, fittings, appliances and apparatus, wireless and television apparatus, &c. The subscribers are: A. F. Chapman, 35, Arlington Road, N.14, and W. R. Wildridge. Registered office: 5, Great Chapel Street, Oxford Street, W.1.

Wirrall Electric, Ltd.—Private company. Registered August 2nd. Capital, £1,000 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in instruments and apparatus used in connection with radio telegraphy and telephony, &c. The subscribers are: W. H. Jones and Mrs. Jane Jones, both of 42, Station Road, Wallasey, Cheshire. Wm. H. Jones signs as director. Registered office: 52, Town Lane, Rock Ferry, Birkenhead.

Widd (1834), Ltd.—Private company. Registered August 4th. Capital, £1,500 in £1 shares. Objects: To acquire the business of manufacturers and writers of signs heretofore carried on by Widd, Ltd., at Castle Works, Bradford, and to carry on the business of manufacturers and erectors of electric signs, &c. The first directors are: A. Widd, High Mead, Westmoor Avenue, Baildon, and two others. Solicitors: Whitaker and Wood, 34, Piccadilly, Bradford.

Neon Star Co., Ltd.—Private company. Registered August 7th. Capital, £1,000 in £1 shares. Objects: To acquire the business of an electrician and neon sign manufacturer carried on by Robert Belot, trading as the "Neon Star Co." at 237, Golders Green Road, Golders Green, N.W.11. The first directors are: R. Belot, 53, Somervell Road, South Harrow; and D. Riggs signs as director. Solicitors: Gisborne & Co., Temple Chambers, E.C.4.

Hughes Trader, Ltd.—Private company. Registered August 3rd. Capital, £2,000 in £1 shares. Objects: To acquire the business of a wireless and electrical dealer carried on by H. Hughes at 28, Pink Lane and 50a, New Bridge Street, Newcastle-upon-Tyne, as the "Wireless Shop." The first directors are: H. Hughes and Mrs. E. Hughes, both of 80, Cleveland Road, Sunderland. Solicitors: Septimus G. Ward and Rose, 91, Westgate Road, Newcastle-upon-Tyne.

Gates, 128, Victoria Park Road, South Hackney, E.9. Registered office: 237, Golders Green Road, Golders Green, N.W.11.

Relay Equipment, Ltd.—Private company. Registered August 3rd. Capital, £1,500 in £1 shares. Objects: To carry on the business of sellers and installers of equipment for wireless reception and rediffusion, &c. The subscribers are: E. L. Fuller, 10, Mount Crescent, Brentwood, Essex, and J. Tunnadine, 156, Bromley Road, Beckenham, Kent. J. Tunnadine

A portion of the Hertford Road recently illuminated with Ediswan "Escura" lamps in "Hertford" lanterns. **(See page 225)**

Cunningham Electrical & Radio, Ltd.—Private company. Registered August 3rd. Capital, £1,000 in £1 shares. Objects: To carry on the business of makers, importers and exporters of and dealers in wireless apparatus, components and accessories, electric lighting and heating, fittings, &c. The first director is A. J. Cunningham. Solicitors: Bulcraig & Davis, Amberley House, Norfolk Street, W.C.2.

Ismay (New Process) Lighting, Ltd.—Private company. Registered August 3rd. Capital, £10,000 in £1 shares. Objects: To carry on the business of manufacturers and suppliers of incandescent and electric lights and other apparatus connected with the illuminating or heating power of gas, electricity, &c. The subscribers are: J. Ismay, 10, Warwick Gardens, Ilford; and Thomas S. Cornwell, 10, Warwick Gardens, Ilford.

Essex Electrical Installations, Ltd.—Private company. Registered August 3rd. Capital, £2,000 in £1 shares (1,950 ordinary and 50 founders'). Objects: To acquire the business of an electrical engineer and contractor now carried on by Gregor M. Ogilvie at 133, London Road, Chelmsford, as the Electric Installation Co. The directors are: G. M. Ogilvie, Brierley Place, Chelmsford, and two others. Registered office: 133, London Road, Chelmsford.

Magnetix, Ltd.—Private company. Registered August 4th. Capital, £100 in £1 shares. Objects: To carry on the business of makers and sellers of magnetic, electrical and electro-magnetic appliances of all kinds, &c. The subscribers are: E. F. Champion and S. G. Streeter, both of 8, Salisbury Square, E.C.4. Solicitors: Champion & Co., 8, Salisbury Square, E.C.4.

Returns of Electrical Companies

Townlea Electrical Co., Ltd.—Capital, £1,000 in 300 preference and 700 ordinary shares of £1. Return dated January 14th (filed April 4th), 1934. 500 ordinary shares taken up. £500 considered as paid. Mortgages and charges nil.

Super Radio (Liverpool), Ltd.—C. B. Burrows, of North House, 17, North John Street, Liverpool, 2, ceased to act as receiver on July 10th, 1934.

Almeida Accumulators, Ltd.—James Kilpatrick, 5, London Wall Buildings, E.C.2, ceased to act as receiver and/or manager on July 30th, 1934.

Southern United Telephone Cables, Ltd.—The nominal capital has been increased by the addition of £25,000 in £1 ordinary shares beyond the registered capital of £50,000.

Halcyon Radio, Ltd.—The nominal capital has been increased by the addition of £9,000 in £1 ordinary shares beyond the registered capital of £1,000. The 20,000 ordinary shares of 1s. in the original capital have been consolidated into 1,000 ordinary shares of £1 each.

Troughton & Young, Ltd.—Particulars filed of debentures not exceeding £4,000 authorised July 30th, 1934, charged on the company's undertaking and property, present and future, including uncalled capital, the amount of the present issue being £4,000.

J. Westrich, Ltd.—Debenture dated July 25th, 1934, to secure £75, charged on the company's property, present and future, including uncalled capital. Holder: Mrs. Deborah H. Maxwell, 166, Wood Street, Walthamstow, E.17.

Aldwych Lamp Co., Ltd.—The nominal capital has been increased by the addition of £5,900 beyond the registered capital of £100. The additional capital is divided into 18,000 ordinary shares of 1s. and 5,000 7 per cent. non-redeemable cumulative preference shares of £1.

Wego Condenser Co., Ltd.—The nominal capital has been increased by the addition of £2,500 in £1 ordinary shares beyond the registered capital of £2,500.

Whitaker Electric Co., Ltd.—The nominal capital has been increased by the addition of £500 in 10s. ordinary shares beyond the registered capital of £500.

Leader-Way, Ltd.—G. Haring, Queen's College, Paradise Street, Birmingham, was appointed receiver on July 28th, 1934, under powers contained in debentures dated August 10th, 1933.

British Quain Sunlight, Ltd.—A. E. Sissons, 31, Monument Street, E.C.3, was appointed receiver and manager on July 3rd, 1934, under powers contained in debentures registered October 22nd, 1930.

Power Centre Co., Ltd.—F. J. Blythe, of Coopers Buildings, Church Street, Liverpool, ceased to act as receiver and manager on August 4th, 1934.

Friar Radio Co., Ltd.—Capital, £1,000 in £1 shares. Return dated December 31st, 1933 (filed July 20th, 1934). 995 shares taken up. £995 considered as paid. Mortgages and charges nil.

Erowash Electric Wire Co., Ltd.—Capital, £3,000 in 2,500 preference shares of £1 and 2,000 ordinary shares of 1s. Return dated December 31st, 1933 (filed May 15th, 1934). 1,067 preference and 2,000 ordinary shares taken up. £3 paid, £1,564 considered as paid. Mortgages and charges nil.

Direct Electric Lamp Co., Ltd.—Capital, £1,000 in £1 shares. Return dated December 31st, 1933 (filed May 9th, 1934). Four shares taken up. £4 paid. Mortgages and charges: £1,000.

Ashley Wireless Telephone Co. (1925), Ltd.—Capital, £2,500 in £1 shares. Return dated December 31st, 1933 (filed May 7th, 1934). All shares taken up. £2,500 paid. Mortgages and charges nil.

Magnetic Separators, Ltd.—Capital, £500 in £1 shares. Return dated January 13th (filed April 27th), 1934. All shares taken up. £500 paid. Mortgages and charges nil.

A. P. Lundberg & Sons, Ltd.—Capital, £30,000 in £1 shares. Return dated March 7th, 1934. All shares taken up. £30,000 paid. Mortgages and charges: £10,000.

W. H. Agar, Ltd.—K. D. Hutton, 407/409, Moorgate Station Chambers, E.C.2, was appointed receiver on July 28th, 1934, under powers contained in debentures dated November 30th, 1933.

A. Warner & Son, Ltd.—Two debentures dated July 13th, 1934, to secure £800 and £3,336 10s. respectively, charged on the company's undertaking and property, present and future, including uncalled capital. Holders: L. E. Warner and A. Warner, both of 7, Howard Road, Walthamstow.

Northampton Electric Light and Power Co., Ltd.—Satisfaction to the extent of £463,000 on July 1st, 1934, of debenture stock authorised by resolutions dated March 11th, 1924, October 21st, 1926, November 12th, 1929, and March 15th, 1932, and registered June 3rd, 1934, November 17th, 1926, December 21st, 1929, and May 5th, 1932, respectively.

Stearn Electric Co., Ltd.—Satisfaction (a) to the extent of £9,400 on July 2nd, 1934, and balance of £600 on July 17th, 1934, of debentures authorised by resolution dated October 20th, 1924, and registered November 4th, 1924; and (b) in full on July 2nd, 1934, of second debentures authorised by resolution dated March 9th, 1933, and registered March 21st, 1933.

Regent Radio Stores, Ltd.—Debenture dated July 19th, 1934, to secure £300, charged on the company's undertaking and property, present and future, including uncalled capital. Holder: Gertie Keidan, 14, London Grove, Liverpool.

British Battery Co., Ltd.—Bernard J. Andrews, 58, High Street, Watford, was appointed receiver and manager on July 28th, 1934, under powers contained in instrument dated March 24th, 1934.

Electra (Birmingham), Ltd.—Capital, £1,500 in £1 shares. Return dated July 11th, 1934. 1,493 shares taken up. £1,293 paid. £200 considered as paid. Mortgages and charges, nil.

Padiham Wireless Relay Co., Ltd.—Capital, £1,000 in £1 shares. Return dated April 24th (filed May 5th), 1934. 825 shares taken up. £825 paid. Mortgages and charges, nil.

Downton Electric Light Co., Ltd.—Capital, £17,500 in 7,500 6 per cent. preference and 10,000 ordinary shares of £1. Return dated March 1st (filed May 22nd), 1934. 3,957 preference and 9,000 ordinary shares taken up. £657 paid. £12,300 considered as paid. Mortgages and charges, nil.

Gamble & Sons, Ltd.—Capital, £4,000 in £1 shares. Return dated December 31st, 1933 (filed June 27th), 1934. 350 shares taken up. £350 paid. Mortgages and charges, nil.

J. W. Gray & Son, Ltd.—Capital, £10,000 in 5s. shares. Return dated July 18th, 1934. 36,000 shares taken up. £6,000 10s. paid. £2,999 10s. considered as paid. Mortgages and charges, nil.

City Notes

Buenos Aires Lacroze Light & Power Co.—In August, 1933, a meeting of the six-and-a-half per cent. sterling redeemable mortgage debenture stockholders appointed a committee to confer with the trustees in view of the prolonged default in payment of interest and sinking fund. A scheme was subsequently prepared, but was not submitted to the stockholders in view of further deterioration in conditions affecting the consumer companies. Information is expected shortly from Buenos Aires, however, on which the company expects to be able to submit further proposals for the consideration of the trustees and the committee.

Westminster Electric Supply Corporation, Ltd.—An interim dividend of 2½ per cent. (same) is announced on account of the standard ordinary dividend for the current year, payable on September 1st.

The Cawnpore Electric Supply Corporation, Ltd., has given notice of a proposal to redeem a part of its 5 per cent. free of tax debentures at the price of £107 per cent. Applications from holders who wish to avail themselves of the offer are to be received by the company by November 1st.

Edmundson's Electricity Corporation, Ltd., reports that the results of the operations of its group of companies during July, as compared with the corresponding month of 1933, show an increase of 17 per cent. in kWh sold.

Stocks and Shares

TUESDAY EVENING.

STOCK Exchange markets find little diminution in the demand for gilt-edged stocks and shares, and prices are accordingly not only well-maintained, but, generally speaking, what changes have occurred are upward. There is, of course, the usual falling-off of business which comes automatically at this season of the year, but, on the other hand, holders are loth to part from their stock, with the result that the constant demand for investments has its inevitable effect upon prices. In opposition to those who have recently been adumbrating against any likelihood of further increase in our national trade, several weighty authorities have entered the field armed with arguments in contravention of the idea that British trade has reached anything like its probable apex under current conditions. In some quarters it is maintained that the daily expansion of electrical enterprise and industry is, in itself, sufficient to warrant the assumption that the allied trades will find plenty of orders to keep them going, repercussion of which would extend in a number of other directions. Now that the labour dispute between the home railway companies and the unions is composed, at any rate for a time, a feeling of greater confidence prevails in regard to the market for these stocks. Possibly the present prices are fairly high, relatively speaking,

but provided the new agreement is honourably respected, the actual low range of values may attract people whose faith in the Home Railway group is still lambent.

London Transport Board

London Passenger Transport "C" stock has risen to 80, ex dividend, more in sympathy with the improvement that has occurred in other Home Rails than for any other reason. The dividend of 3 per cent. on the stock is to be paid a month hence, and at the present price the yield works out to 3¾ per cent. on the money, a return that is considered by no means bad, in view, of course, of the likelihood that the stock will get a higher dividend for the current year. Moreover, hopefulness refuses to admit that there is little chance of a further distribution being made, in addition to the 3 per cent. for the year that ended on June 30th last. Of the Board's prior-charge stocks, the "A" and "B" issues are both better. Central Electricity issues remain very firm, without quotable alterations in the prices.

Dollar Stocks

President Roosevelt's latest surprise has been to bring all the silver in America under control of his Government. This arouses fresh controversy in the matter of the price of gold, and it has also had the effect of advancing prices of stocks and shares connected with the silver-issuing countries, more particularly Mexico and China. So far as the Mexican utility stocks are concerned, no particular changes have occurred. Upon the prices of American and Canadian dollar stocks, the effect of the silver announcement is only indirect. American Telephone and Telegraph at 108½ is a point higher. Internationals are up to 10. The Canadian utility issues are steady. Montreal Light and Power shares are 2 higher at 36. Amongst other dollar stocks, Brazilian Tractions have once more got back into double figures, on the impression that the shares look attractive as a gambling counter. The discussions in regard to the price of gold are reflected in fresh improvements in the prices of gold-mining shares, and, because of the feverish activity now prevailing on the Rand, Victoria Falls and Transvaal Power ordinary shares at 6¼ are again better.

Electricity Supply Shares

The changes in prices on the week are mostly due to the quotation of various shares ex dividend. The ordinary shares of the London companies hold to their previous level of 34s. to 34s. 6d., at which the yield on the money is a shilling or two over 4 per cent. No changes occurred upon circulation of vague details of a scheme said to be under consideration by the Government, the Central Electricity Board, and various other important parties, that would mean practically one vast merger of electricity supply interests in this country. Shares in some of the provincial companies have come into request. In the London group Metropolitans, while quotably unchanged, are a slightly harder market. Edmundson's went a shade better to 39s. on the increase of 17 per cent. in units sold during last month, as compared with July, 1933. British Power and Light ordinary are a trifle easier at 19s. 4½d. Five thousand shares came on offer at a little above this price. In each of the last three years the company paid 3 per cent. on the ordinary capital, the dividends being distributed in May. There are 5,000 Scottish Power ordinary offered at 40s. 6d.; paying virtually 4 per cent. on the money, and 5,000 Yorkshire Electric Power ordinary can be obtained at 46s. 6d. ex dividend, the return here being £3 8s. 9d. per cent. on the money. In the case of the London companies, 500 to 2,000 shares are available of Charing Cross, Chelsea and St. James'. The St. James' Company paid 7½ per cent. dividend last year, against the 7 per cent. standard rate distributed by most of the other London undertakings.

Manufacturing Companies' Shares

Siemens ordinary have rallied to 17s. Henley's 4½ per cent. preference recovered the dividend of 2s. 3d. gross deducted from the price this week. Electric Constructions fell back to 10s. Ever Ready shares at 28s. 6d. show a fall of 6d. The iron and steel market is quiet. Babcock & Wilcox at 44s. reflect the willingness of investment to accept a meagre yield at the present time from shares that can be reasonably expected to pay better in the course of two or three years. The rubber market finds a steady demand for its best-class shares.

Cables and Wireless

The 5½ per cent. preference stock of Cables & Wireless keeps at a little under 70, the buyers of industrial issues being more concerned with speculative investment in other branches. The market in the three stocks of the combine has fallen once more upon quiet days. Indeed, the market for telegraphs and telephones as a whole is attracting but little public attention at the present time. A small rise took Telephone Manufacturing to 3s. 6d. Telephone Rentals firmed up to 8s. 3d. Marconi Marines keep their improvement at 31s. 3d. There has been some inquiry for shares of companies connected with radio, in consequence of the opening of the Exhibition at Olympia this week. Electric and Musical Industries jumped to 28s., New York being an insistent buyer. International Automatic Telephone ordinary at 33s. 9d. and the B deferred at 33s. 6d. are a shade better. Ericsson Telephones at 71s. 3d. have been wanted on reports that the company is making good progress. Enfield Rolling Mills hold their previous price of 29s.

Share List of Electrical Companies

	Nom.	Dividend. 1932.	Dividend. 1933.	Price. Aug. 14.	Rise or Fall.	Yield. p.c. £ s. d.
HOME ELECTRICITY COMPANIES.						
Bournemouth and Poole	1	15	15	77/6	—	3 17 2
Brompton Ordinary	1	7	7	34/-xd	+6d.	4 2 4
Charing Cross Ordinary	1	7	7	34/6xd	+6d.	4 1 2
Chelsea	1	7	7	34/-	—	4 2 4
City of London	1	7½	7½	35/-	—	4 5 9
Clyde Valley	1	7	7	39/6	—	3 10 9
County of London	1	10½	10½	57/6	—	3 13 1
Edmundson's 7% Pref.	1	7	7	34/6	+6d.	4 1 2
Elec. Dis. Yorkshire	1	9	9	47/-	—	3 16 6
Elec. Supply Corporation ...	1	11	11	3	+6d.	3 13 4
Kensington Ordinary	1	7	7	34/-	—	4 2 4
Lancs Light and Power	1	7	7½	37/6	—	4 0 0
London Electric	1	7	7	34/-xd	—	4 2 4
Metropolitan	1	10	10	52/6	—	3 16 2
Midland Counties	1	7	7	37/6	—	3 14 8
Mid. Elec. Power	1	8	8	43/9	—	3 13 2
North Eastern Electric Ordinary	1	6	6	33/-	—	3 12 10
Do. 7% Pref.	1	7	7	35/-	—	4 0 0
Northampton	1	10	10	53/-xd	—	3 15 4
Notting Hill 6% Pref.	10	6	6	14½	—	4 4 4
North Met. Elec. Ordinary ...	1	10	10	3⅛xd	—	3 5 3
Do. do. 6% Pref.	1	6	6	31/-	—	3 17 5
St. James' and Pall Mall ...	1	7	7½	35/-	—	4 5 9
Scottish Power	1	8	8	40/-	—	4 0 0
South London	1	7	7	36/-	—	3 17 9
Westminster Ordinary	1	7	7	34/6	—	4 1 2
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	21/-	—	7 2 10
Yorkshire Elec.	1	8	8	46/3	—	3 9 1
PUBLIC BOARDS.						
Central Electricity, 1950–70 ...	Stock	5	5	115	—	4 7 0
Do. 1955–75 ...	,,	5	5	118	—	4 4 9
Do. 1951–73 ...	,,	4½	4½	109	—	4 2 7
Do. 1963–93 ...	,,	—	3½	101	—	3 9 4
London & Home Counties, 1955–75	,,	4½	4½	108	—	4 3 4
London Passenger Transport, A...	,,	—	4½	118½	+½	3 16 0
Do. do. B...	,,	—	5	122	+1	4 2 0
Do. do. C...	,,	—	3	80xd	+3½	3 15 0
West Midlands Joint Elec. 1948–68	,,	—	5	114	—	4 7 9
TELEGRAPH AND TELEPHONES.						
American Tel. & Tel.	$100	9	9	108½	+1	8 5 10
Anglo-Am. Tel. Pref.	Stock	6	6	112	—	5 7 2
Do. Def.	,,	1½	1½	27	—	5 11 1
Cables & Wireless 5½% Pref. ...	,,	2¾	2¾	69½	—	3 19 2
Do. A. 7½% Ord.	,,	Nil	Nil	13	—	—
Do. B. Ord.	,,	Nil	Nil	6½	—	—
Globe Tel. and T. Ord.	10	Nil	2½	8¾	−½	2 17 6
Do. do. Pref.	10	6	6	12½	—	4 18 0
Great Northern Tel.	10	20	20	35	—	5 14 4
Marconi-Marine	1	10	7½	31/3	—	4 16 0
Oriental Telephone Ord.	1	12	12	3⅛	—	*3 15 3
HOME AND FOREIGN TRAMS, ETC.						
Anglo-Arg. Trams First Pref. ...	5	Nil	Nil	1/6	—	—
Do. do. 2nd Pref. ...	5	Nil	Nil	1/6	—	—
Do. do. 5% Deb.	Stock	Nil	Nil	3½	—	—
British Electric Traction Df. Ord.	,,	5	5	645	—	—
Do. do. Pref. Ord.	,,	8	8	157½	—	5 1 7
Brazil Traction	100	—	—	10	+⅛	—
Brit. Columbia Elec. Rly. Pce. ...	Stock	5	5	105	—	4 15 3
Mexico Trams, 5% Bonds ...	—	5	5	22½	—	—
Mexican Light Common	100	Nil	Nil	2½	−1	—
Do. 7% Pref.	100	7	7	7½	—	—
Do. 1st Bonds	—	5	5	47½	—	10 10 6
Victoria Falls Ord.	1	15	20	6½	+⅛	3 1 6
Yorkshire (West Riding) ...	1	2½	5	25/9	—	3 17 8
MANUFACTURING COMPANIES.						
Aron Electricity Ord.	1	10	10	53/9	—	3 14 6
Assoc. Elec. Ord.	1	4	3	18/6	—	3 4 10
Do. Prf.	1	8	8	32/-	—	5 0 0
Babcock & Wilcox	1	9	6	44/-	+1/-	2 14 7
British Aluminium Ord.	1	5	5	28/3	—	3 11 0
British Insulated Ord.	1	15	15	70/-	—	4 5 9
Brush Ord.	Stock	Nil	Nil	33	—	—
Callender's	1	15	15	3⅞	—	4 14 1
Do. 6½% Pref.	1	6½	6½	31/3	—	4 3 2
Crompton Parkinson Ord. ...	5/-	22½	12½	25/6	—	4 18 4
Do. 8% Pref.	1	8	8	33/9	—	4 14 10
Edison-Swan 1st Pref.	1	7½	7½	21/3	—	7 1 2
Do. 5% Deb.	Stock	5	5	107½	—	4 13 0
Electric Construction	1	Nil	Nil	10/-	−⅛	—
Enfield Cable Ord.	1	25	20	85/-xd	−1/-	4 14 1
English Electric	1	Nil	Nil	5/9	—	—
Do. do. Pref.	1	Nil	Nil	9/6	—	—
Ever Ready	5/-	35	35	28/6	−6d.	6 2 8
Ferranti Pref.	1	7	7	26/6	—	5 5 8
G.E.C. Pref.	1	6½	6½	32/6	—	4 0 0
Do. Ord.	1	8	8	45/-	—	3 11 1
Henley's	1	30	30	6¼	—	4 17 8
Do. 4½% Pref.	5	4½	4½	5½xd	+1/9	4 1 9
India-Rubber Preferred	1	—	—	18/9	—	—
Johnson & Phillips	1	5	5	22/-	—	4 11 0
Siemens Ord.	1	6½	4	17/-	+9d.	4 14 2
Telegraph Construction	£1	Nil	Nil	1	—	—

*Dividends paid free of Income Tax.

Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specifications will be printed and all subsequent proceedings will be taken.

1932

29505. "Protection of electrical communication lines from interference." E. J. Aubort. October 21st, 1932. (413712.)

32077. "Protection of electrical communication lines from interference." E. J. Aubort. November 12th, 1932. (413656.)

32160. "Electric ship-propulsion systems." General Electric Co., Ltd., and C. C. Garrard. November 14th, 1932. (413668.)

35154. "Automatic voltage control of electricity supply systems." Johnson & Phillips, Ltd., and J. Bloome. December 12th, 1932. (413669.)

35658. "Magneto-electric machines especially for internal combustion engines." J. Bohli and G. Steiner. December 19th, 1931. (413716.)

35753. "Electric controlling and regulating systems." British Thomson-Houston Co., Ltd. December 16th, 1931. (413634.)

35857. "Alternating-current power-transmission circuits with alternating current or rectified current output." A. S. Fitzgerald. December 17th, 1931. (413671.)

35871. "Electrical relays for use in automatically reclosing circuit-breaker systems." C. M. Ellis. December 17th, 1932. (413635.)

36005. "High-frequency signalling systems." British Thomson-Houston Co., Ltd. December 18th, 1931. (413691.)

36024. "Soldering of parts of incandescent electric lamps and the like." British Thomson-Houston Co., Ltd. December 19th, 1931. (Addition to 381031.) (413672.)

36129. "Reactance-operated protective arrangements for electric circuits." International General Electric Co., Inc. December 21st, 1931. (413692.)

36159. "Braun tube." Dr. K. Schlesinger. December 24th, 1931. (413720.)

37036. "Electrical condensers." Telegraph Condenser Co., Ltd., and P. A. Sporing. January 1st, 1934. (413746.)

1933

1198. "Electric relay arrangements." A. Reyrolle & Co., Ltd., and H. Leben. January 13th, 1933. (413723.))

1334. "Internal combustion locomotives having electrical power transmission." Maschinenfabrik Augsburg Nürnberg Akt.-Ges. February 27th, 1932. (413678.)

1401. "Superheterodyne wireless receiving sets." General Electric Co., Ltd., N. J. McAinsh, and S. Sharp. January 16th, 1933. (413724.)

1420. "Control of direct-current electric motors." A. D. Ferguson and Associated Electrical Industries, Ltd. January 16th, 1933. (413641.)

1421. "Control of direct-current electric motors." W. T. Gray and Associated Electrical Industries, Ltd. January 16th, 1933. (413642.)

1552. "Scanning devices for use in television and like facsimile systems." Marconi's Wireless Telegraph Co., Ltd., H. M. Dowsett and E. F. Goodenough. January 17th, 1933. (413645.)

1553. "Ultra-short wave modulated carrier-wave radio communication systems." Marconi's Wireless Telegraph Co., Ltd., and A. A. Linsell. January 17th, 1933. (413646.)

1554. "Carrier-wave transmission systems." Marconi's Wireless Telegraph Co., Ltd. January 23rd, 1932. (413647.)

1594. "Operators' and like telephone sets." Standard Telephones & Cables, Ltd., L. C. Pocock and H. T. Turton. January 18th, 1933. (413659.)

1661. "Routine testing arrangements, particularly for automatic telephone exchange systems." Siemens Bros. & Co., Ltd., D. A. Christian and W. H. J. Dibben. January 18th, 1933. (413682.)

1672. "Safety devices for electrically driven vehicles." G. R. Higgs and Associated Electrical Industries, Ltd. January 18th, 1933. (413696.)

1757. "Sockets for pin-and-socket electrical couplings." J. B. Tucker. January 19th, 1934. (413748.)

1781. "Method of testing telegraph apparatus and systems." E. H. Jolley. January 19th, 1933. (413726.)

1792. "Electric incandescent lamp holders combined with thermal switches for intermittent flashing." R. Collier, January 19th, 1933. (413685.)

1814. "Vacuum furnaces." H. Smethurst, F. E. Bancroft, G. Burrows and Asociated Electrical Industries, Ltd. January 19th, 1933. (413698.)

1840. "Excess voltage protective electric discharge devices." British Thomson-Houston Co., Ltd. January 20th, 1932. (413749.)

1908. "Telephone or like systems." Standard Telephones and Cables, Ltd., and J. R. Gould. January 20th, 1933. (413701.)

1932. "Electrical switchgear." A. C. Ehrenberg and Associated Electrical Industries, Ltd. January 20th, 1933. (413702.)

1938. "Lamps for street illumination and like purposes." C. H. A. Kempton and E. H. P. M. Parsons. January 20th, 1933. (413703.)

1945. "Systems of electric motor control." British Thomson-Houston Co., Ltd., W. J. Pool and K. M. Fox. January 20th, 1933. (413704.)

1946. "Systems of speed control for electric motors." British Thomson-Houston Co., Ltd., and H. W. C. Liddiard. January 20th, 1933. (413705.)

1947. "Ignition devices for self-propelled vehicles." British Thomson-Houston Co., Ltd., and L. Griffiths. January 20th, 1933. (413706.)

2037. "Railway light signals." Westinghouse Brake and Saxby Signal Co., Ltd. May 12th, 1932. (413730.)

2038. "Radio-receiving apparatus." Westinghouse Brake and Saxby Signal Co., Ltd. May 12th, 1932. (413731.)

2492. "Oil-immersed electric circuit-breakers." A. Reyrolle and Co., Ltd., and J. Christie. January 26th, 1933. (413751.)

2574. "Cathode-ray tubes." Marconi's Wireless Telegraph Co., Ltd., and A. Ladner. January 26th, 1933. (413757.)

3061. "Indirectly heated cathode." Radioakt.-Ges., D. S. Loewe and Dr. E. Waldschmidt. February 2nd, 1932. (413766.)

3567. "Dynamo-electric machines." W. Scott. February 6th, 1933. (413771.)

3789. "High-tension direct-current electrical generating systems." English Electric Co., Ltd., J. E. Calverley and W. Donnelly. February 8th, 1933. (413774.)

3892. "Voltage regulation of grid-controlled rectifiers." Siemens-Schuckertwerke Akt.-Ges. February 9th, 1932. (413775.)

5579. "Electrical choke coils." A. Tustin, A. J. King, C. Dannatt and Associated Electrical Industries, Ltd. February 23rd, 1933. (413792.)

6389. "Means for altering the timing of electrical impulses, more particularly for the grid control of vapour-arc rectifiers." English Electric Co., Ltd., J. E. Calverley and R. D. Ball. March 2nd, 1933. (413797.)

6493. "Electrostatic precipitating plant." Sturtevant Engineering Co., Ltd., and H. W. Wagner. March 3rd, 1933. (413800.)

6987. "Switches with plug-in sockets." A. Watson. March 8th, 1933. (413803.)

7182. "Electric torches, spotlights, and the like." Ever Ready Co. (Great Britain), Ltd., and M. van Koningsveld. March 9th, 1933. (413805.)

7744. "Circuit arrangements for electric relays." Siemens Bros. & Co., Ltd., and H. E. Humphries. March 14th, 1933. (413810.)

7985. "Cathode-ray tubes." Fernseh Akt.-Ges. March 16th, 1932. (413812.)

9136. "Means for the production of electrical impulses." English Electric Co., Ltd., W. E. M. Ayres and J. E. Calverley. March 27th, 1933. (413820.)

9186. "Rotary electric switches." A. F. Bulgin, W. G. Andrews and H. T. Stott. March 27th, 1933. (413821.)

9745. "Magneto-electric machines." British Thomson-Houston Co., Ltd., L. Griffiths and K. Hulme. March 31st, 1933. (413822.)

12084. "Invertors for electric current." General Electric Co., Ltd., and C. R. Dunham. April 25th, 1933. (413833.)

12416. "Cooling of dynamo-electric machines." P. Ehrmann. April 30th, 1932. (413835.)

13040. "Electric cables." Pirelli-General Cable Works, Ltd., and J. L. Bishop. May 4th, 1933. (413841.)

13116. "Electric lighting fittings." G. Campbell and Benjamin Electric, Ltd. May 5th, 1933. (413842.)

14402. "Loud-speakers and the like." General Electric Co., Ltd., and D. A. Oliver. May 18th, 1933. (Cognate application 25784/33.) (413848.)

16563. "Electric cables." Okonite-Callender Cable Co., Inc. June 9th, 1932. (413858.)

19555. "Thermionic oscillation generators." Telefunken Ges. für Drahtlose Telegraphie. July 8th, 1932. (413868.)

25374. "Television systems." Marconi's Wireless Telegraph Co., Ltd. (Radio Corporation of America). September 13th, 1933. (413894.)

27338. "Electric switch mechanism for controlling the movement of motor-driven doors." National Pneumatic Co. November 5th, 1932. (413901.)

28083. "Electrical insulating material." British Thomson-Houston Co., Ltd. October 11th, 1932. (413905.)

29032. "Electrical earthing devices." W. S. Smith and D. Brookfield. October 20th, 1933. (413914.)

29866. "Radio-receiving systems." Amy, Aceves & King, Inc. October 31st, 1932. (413917.)

30004. "Discharge tube apparatus for producing, amplifying, or receiving high-frequency oscillations." Naamlooze Vennootschap Machinerieen-en Apparaten Fabrieken. November 11th, 1932. (413918.)

30709. "Operation of vapour- or gas-filled electric discharge devices." British Hanovia Quartz Lamp Co., Ltd., and J. W. Kolbert. November 4th, 1933. (413921.)

30786. "Electric welding generators." Allmänna Svenska Elektriska Aktiebolaget. October 9th, 1933. (413924.)

33483. "Radio navigational systems." Telefunken Ges. für Drahtlose Telegraphie. November 29th, 1932. (413940.)

34209. "Radio receivers." K. Jüdell. December 6th, 1932. (413946.)

34722. "Oxide-coated cathodes for electron-discharge tubes." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. December 10th, 1932. (413950.)

35104. "Television." F. C. P. Henroteau. December 15th, 1932. (413954.)

35248. "Luminous electric discharge tubes." General Electric Co., Ltd. December 31st, 1932. (413959.)

35621. "Frequency modulated carrier-wave apparatus." Marconi's Wireless Telegraph Co., Ltd. December 17th, 1932. (413961.)

1934

166. "Contact protection hoods for X-ray tubes." C. H. F. Müller Akt.-Ges. January 3rd, 1933. (413970.)

836. "Short-wave thermionic valve transmitter arrangements." Telefunken Ges. für Drahtlose Telegraphie. January 9th, 1933. (413973.)

2187. "Electrical machines for welding or heating by resistance." D. Sciaky. January 23rd, 1933. (413664.)

2250. "Electric switches, more particularly tumbler switches." G. Becker, Ltd. (Vedder Ges. Geb.). January 22nd, 1934. (413976.)

5449. "Mounting arrangements for cathode-ray tubes." A. C. Cossor, Ltd. (Baron M. von Ardenne). February 17th, 1933. (413995.)

5877. "Television." F. C. P. Henroteau. February 22nd, 1934. (413996.)

6207. "Electric condensers." J. Y. Johnson (Allmänna Svenska Elektriska Aktiebolaget). November 15th 1932. (Divided application on 32294/32.) (413654.)

12188. "Electrical phase-shifting means." A. S. Fitzgerald. December 17th, 1932. (Divided application on 413671.) (413741.)

13409. "Electric discharge tubes." Naamloose Vennootschap Philips' Gloeilampenfabrieken. June 3rd 1933. (Addition to 392796.) (414018.)

19322. "Vacuum furnaces." H. Smethurst, F. E. Bancroft, G. Burrows and Associated Electrical Industries, Ltd. January 19th, 1933. (Divided application on 413698.) (413743.)

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Aberdeen.—Cinema for the Aberdeen Picture Palace, Ltd. (£30,000); T. Scott Sutherland, architect. Reconstruction and extension to Walker Road School for E.C.; A. B. Robertson & Son, Ltd., 280, Union Street.

Airdrie.—Houses (132), Forrest Street and Colliertree Road, Clarkston; Geo. Arthur & Son, 4, Graham Street, Airdrie.

Aldershot.—Houses (48) and extensions, Municipal buildings (£11,000), and school (£20,000), Aldershot Park; borough surveyor.

Amesbury.—Houses (32), Figsbury Rings, Winterbourne Earls, for J. Thompson.

Armadale.—Houses (40), Mayfield; A. Simpson, burgh surveyor, Council Offices, Bathgate.

Ashby-de-la-Zouch.—Houses (28), Burton Road; L. Swanwick, architect, Temple Chambers, Belvoir Road, Coalville.

Ashby Woulds.—Houses (48); Simmons Bros. & Wardle, builders, Rothley.

Ayrshire.—Houses (792) (during the year), and 150 houses at Stevenston, for the C.C.; clerk, Ayr.

Batley.—Houses (40), Purlwell House Estate; borough surveyor.

Battle.—Houses (34), Baldslow Place Estate; R.D.C. surveyor.

Bedford.—Houses, church and schools, Stewartby; London Brick Co. & Forders, Ltd.

Bedfordshire.—Institution for Bedfordshire and Northamptonshire Board for Mental Defectives (£110,000); Whitwell & Son, 3, Newhall Street, Birmingham. School, Sharnbrook, for County E.C.; director of education, Bedford.

Bexleyheath.—School, Woolwich Road; Wallace & Co., builders, Gravesend. Schools, Brampton Road; H. Friday & Sons, builders, Erith.

Birmingham.—Factory, Hampton Works, Ripple Road and Twyning Road, Stirchley; C. Bryant & Sons, builders, Whitmore Road, Small Heath. Factory, Shaftmoor Lane, Acocks Green, for Joseph Lucas, Ltd., Great King Street; Wm. Wilkinson, Ltd., builders, Hutton Road, Handsworth.

Blackpool.—Houses (75), Bispham Road; J. Cryer & Sons. Houses (58), Luton Road, and 18 at Falkland Avenue; R. & H. Fletcher. Shops and houses at the junction of Preston New Road and Newhouse Road; Halstead Best.

Bourne.—Houses (50); U.D.C. surveyor.

Bramhall (CHESHIRE).—Cinema and shops, Woodford Road and Birch Road, for C. Greenhalgh.

Bredbury (CHESHIRE).—Houses (300), Bents Lane; W. G. West, builder, Stockport.

Bristol.—Church, Hengrove; Downing & Rudman, architects, Chippenham.

Buckinghamshire.—Police station and headquarters, Aylesbury (£14,461), for C.C.; county surveyor, Aylesbury.

Campbeltown.—Houses (46); Jas. Thomson & Sons, 7, Victoria Place, Airdrie.

Campden.—Houses (36); E. H. Earp, architect, 48, Henley Street, Stratford-on-Avon.

Cardiganshire.—School extensions, Aberayron (£9,500), and Llandyssul (£9,000); county architect, Aberystwyth.

Caterham.—Houses (62), Godstone Road; Sir Bernard Greenwell. Houses (34), Ninehams Road; W. J. Burstow.

Chatham.—Houses (52); W. T. Davis & Son, Ltd., builders. Houses (40) and flats; borough surveyor.

Chesham.—Houses (30); J. J. Sugars, builders, Luton.

Cheshire.—Extensions, Clatterbridge Hospital (£97,100), for C.C.; county architect, Chester.

Chesterfield.—Houses (112), Eckington; R.D.C. surveyor. Houses (28) and bungalows; Walters & Westley, Ltd., builders, Woodseats, Sheffield. Central offices, houses and workshops, New Beetwell Street; Chesterfield and Bolsover Water Board.

Chichester.—R.C. church, school, hall and presbytery (£25,000); Rev. R. C. Measures, St. Richard's Church.

Clacton-on-Sea.—Houses (30) and flats, Beaumont Avenue, for W. L. Smee.

Coatbridge.—Cinema for the Scottish Cinemas and Variety Theatres, Ltd., Glasgow; J. M'Nair, architect, Glasgow.

Colchester.—Houses (50), Ipswich Road; borough engineer. Bazaar stores, Pelham's Lane, for F. W. Woolworth & Co., Ltd., London.

Coventry.—Congregational church; C. Redgrave, Barbican Chambers, Earl Street. School, Coundon housing site, for City E.C.; director of education.

Cowdenbeath.—Houses (40), Moss-side site; C. A. Alexander, burgh surveyor, Town House.

Deal.—Senior school (400 places), for Borough E.C.; H. M. Barker, architect, Barton House, 16, King Street.

Dewsbury.—Houses (74), Heckmondwike Road, and 30 houses, Scopsley Lane, Whitley; borough architect. School (850 places), Temple Road, for Borough E.C.; director of education.

Didcot.—Houses (88), Harwell Road, for 1933 Housing Society, Ltd.

Dover.—Flats (£12,945); G. Lewis & Sons, builders.

Durham.—Houses (32), Mount Oswald, for A. H. Fennell.

East Elloe (LINCOLNSHIRE).—Houses (36), Gedney; T. J. Jupp, junior, builder, Walsoken.

East Lothian.—Houses (162); county architect, County Buildings, Haddington.

Eckington (DERBYSHIRE).—Houses and flats (100), Chesterfield Road, for the Newholm House Trust; W. L. Hind, architect, Hanley.

Edinburgh.—Houses (44), Easter Warriston, Ferry Road; J. A. W. Grant, architect, 25, Rutland Square. Chapel, Princes Street West, for the Church of St. John the Evangelist: Dick Peddie and Walker Todd, architects, 8, Albyn Place. Offices and warehouses (£30,000), Coburg Street, Leith, for David Bell, Ltd.

Eton.—Houses (26); W. David Hartley, U.D.C. architect, Slough.

Glasgow.—Bank, Bothwell Street and Wellington Street, for Commercial Bank of Scotland, Ltd.; J. B. Meiklejohn, Ltd., 1, Newton Place.

Gloucester.—Cinema, Barton Street (£25,000); E. C. Morgan Willmott, architect, 27, Park Place, Cardiff.

Gravesend.—Senior school; King St. Old National School Foundation.

Greenford.—Cinema, Ruislip Road; J. Wrightson Bateson.

Guildford.—Two senior schools (£20,720), Stoughton, for Borough E.C.; director of education.

Hailsham (SUSSEX).—Houses (149), Bolney Wood, South Road, for A. S. Boniface.

Halesowen.—Houses (30); J. Tolley, builder.

Halifax.—Houses (50), Ovenden Hall Estate (electrical work); D. T. Lloyd Jones, borough engineer.

Hampshire.—Additions to Senior Boys' School, Fareham, and extensions to Senior School, Hedge End, for County E.C.

Headington.—Houses (22), Great Headley Estate; Great Headley Homesteads, Ltd.

Hemel Hempstead.—Infants' and junior school, for Borough E.C.; H. P. G. Maule, architect, 12, Stratford Place, London, W.

Herefordshire.—School, Ledbury, for County E.C.; county architect, Hereford.

Hetton-le-Hole (DURHAM).—Houses (72), Peat Carr Farm Estate; A. V. Clery, builder, Sunderland.

Huntingdon.—Bazaar stores, High Street, for F. W. Woolworth & Co., Ltd., London.

Ilkeston.—Houses (52), Corporation Road; borough engineer.

Inverness.—Public baths (£15,644); burgh surveyor.

Kent.—Hospital, Lyminge, for the P.A.C.; clerk, Maidstone.

Kirkheaton (YORKS).—Chemical works, Battyeford, for H. Edward Hope & Co., Ltd., Plaistow, London, E.

Leicester.—Ballroom, café, and additional storey, Victory Hotel, Great Central Street; W. Smith & Son, 6, Waterloo Street.

London.—(EALING).—Houses (30), Twyford Avenue; R. Lancaster & Sons. Factory, Wadsworth Road; Vinco, Ltd. Block of flats, Mount Avenue; E. Roper. Health centre, Perivale; borough engineer. Shops and flats, Haven Green; Housing Corporation of Great Britain, Ltd. Shops, offices and flats, Uxbridge Road, and Longfield Avenue, for J. Gould; E. Schaufelberg.

Manchester.—Houses (71), Orchard Road and Howard Road, Northenden; Haughton Barnes, Ltd., builders, 8, Water Street. Houses (32), St. Mary's Road and Shelley Street, Moston; W. A. Luty, builder, 46, Endsleigh Gardens, Blackpool. Houses (32), Sandilands Road, near Altrincham Road; Jonathan Partington, Ltd., builders, Middleton Junction.

Mansfield.—Houses (34), by direct labour (£10,650), Ravensdale Estate; borough engineer.

Morecambe.—Houses (39), Lathom Grove; A. Heathcote.

Morley.—Reinstatement after fire (£20,000 damage), for Wilson & Swallow, Brunswick Mill.

Nairn.—Houses (44); J. H. G. Peter, burgh surveyor, Queen Street.

Newton Abbot.—Cinema (1,250 seats) for the Tower Co., Ltd.; H. Williams, architect, Cardiff.

Northamptonshire.—Extensions, Berry Wood Hospital, for C.C. (£24,000); Gotch, Saunders & Surridge, Bank Chambers, Kettering.

Ollerton (CHESHIRE).—Houses (250), near Ollerton Hall site (£250,000); Smethursts Industries, Ltd., 37, Deansgate, Arcade, Manchester.

Ormskirk.—Houses (46), Scarisbrick Street; U.D.C. surveyor.

Oxford.—Houses (120), Marston Housing Estate; city engineer.

Ravensthorpe.—Houses (29), Spen Valley Road, for Ravensthorpe Gardens Housing Estate; H. Brearley, architect, Westfield, Syke Lane, Earlsheaton, Dewsbury.

Richmond-on-Thames.—Houses (30), Queen's Road, for F. S. Fox.

Romford.—Factory, Oldchurch Road, for Hall & Co., Ltd.

Rugby.—Houses (48); town clerk. Telephone exchange for H.M. Office of Works; W. R. Lane & Son, Ltd., Foster Road, Coventry.

St. Albans.—Houses (34), Wheathampstead; R.D.C. surveyor.

Shrewsbury.—Public baths, Gay Meadow (£6,000); borough surveyor.

South Shields.—Boys' High School, Harton; G. R. Smith, architect, Winchester Street.

Spalding.—Houses (86); U.D.C. surveyor.

Staffordshire.—Isolation hospital, Wordsley, for C.C.; county architect, Stafford.

Stevenage.—Cinema, café, dance hall, &c., London Road, for A. A. Kempner.

Stoke-on-Trent.—High School, Thistley Hough, Penkhull, and senior school, Carmountside (£8,140), for City E.C.; director of education.

Stourbridge.—Houses (138); borough surveyor.

Stroud.—Houses (78) and public baths (£25,000); U.D.C. surveyor.

Surrey.—Schools, Beddington, Carshalton, East Molesey, Hackbridge, Kenley, and Surbiton; county architect, Kingston-on-Thames.

Tendring (ESSEX).—Three years' housing programme (200 houses and double bungalows); R.D.C. surveyor.

Torquay.—Public library (£27,000), and schools, Barton Road; borough engineer.

Twickenham.—Houses (118), Hospital Bridge Road; New Ideal Homesteads, Ltd.

Weston-super-Mare.—Isolation hospital extensions (£10,000); Spackman & Sons, builders, Swindon.

Wiltshire.—Extensions, Senior School, Southbroom, for County E.C.

Worcestershire.—Police station, Evesham (£12,000); county architect.